GAS

DECEMBER 1960

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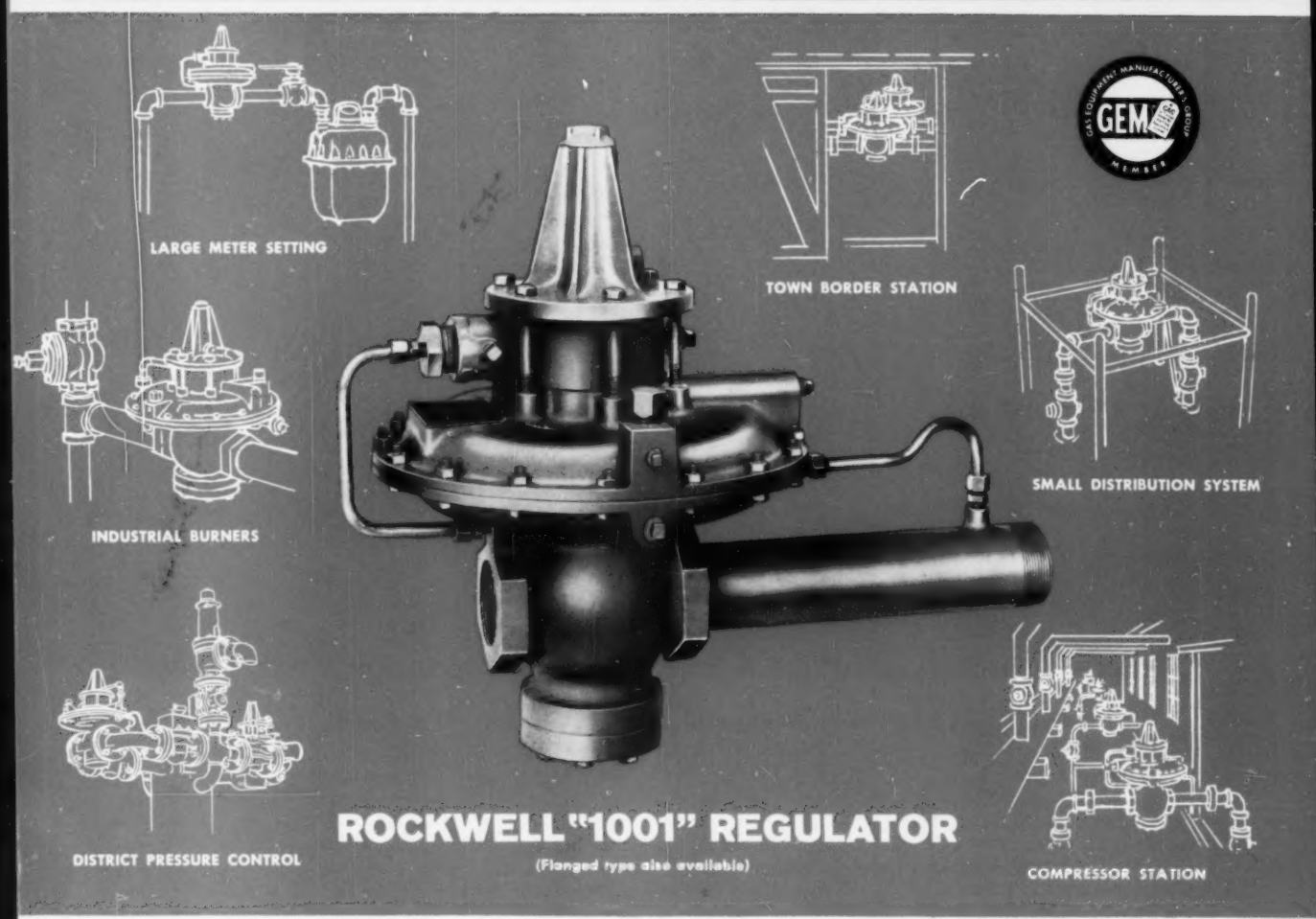

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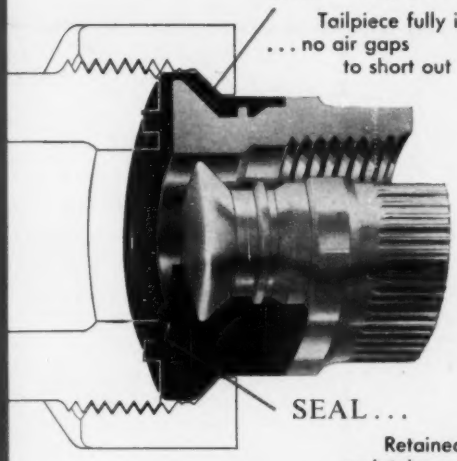

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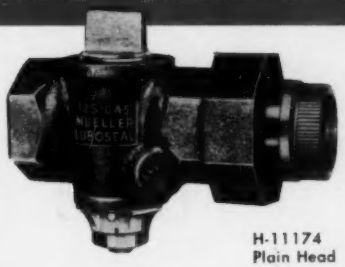
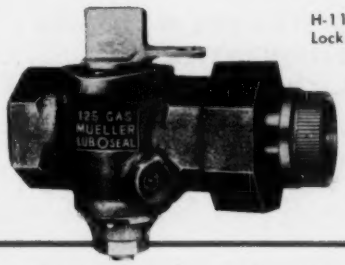


H-11174
Plain Head



H-11179
Lock Wing

SPECIFICATIONS

Iron body, bronze key
Straight way, solid head
Tamperproof

Inlet: Inside I.P. Thread
Outlet: Insulating Union
Finish: Black
(Tailpiece cadmium-plated)

Working pressure: 125 p.s.i.
Working temperature range: —20° F. to 150° F.
Sizes: ¾", 1", 1¼"

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Plain Head
Sizes: ¾", 1", 1¼", 1½", 2", 2½"

H-11175
Lock Wing
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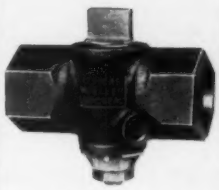

H-11173
Plain Head
Recessed Ends
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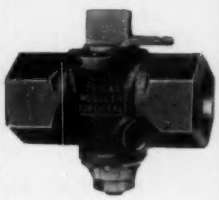

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Lock Wing
Recessed Ends
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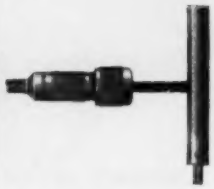

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Lower Photo: Electro-Hydraulic system provides extra sensitive response, permitting close regulation.

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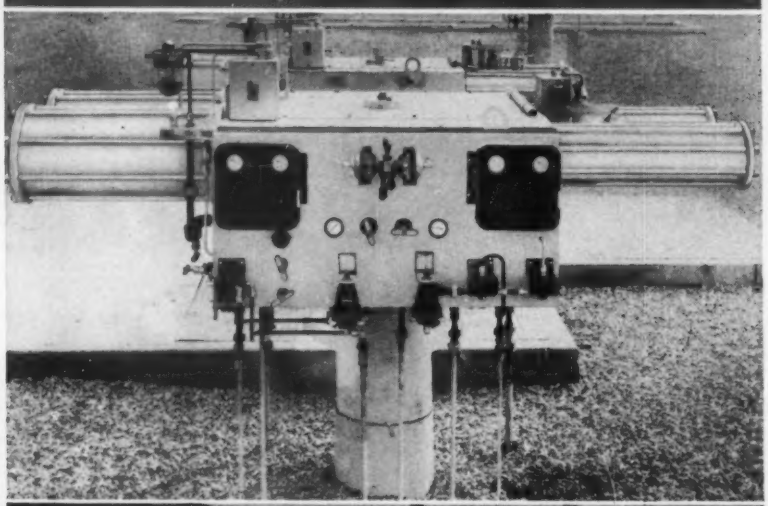

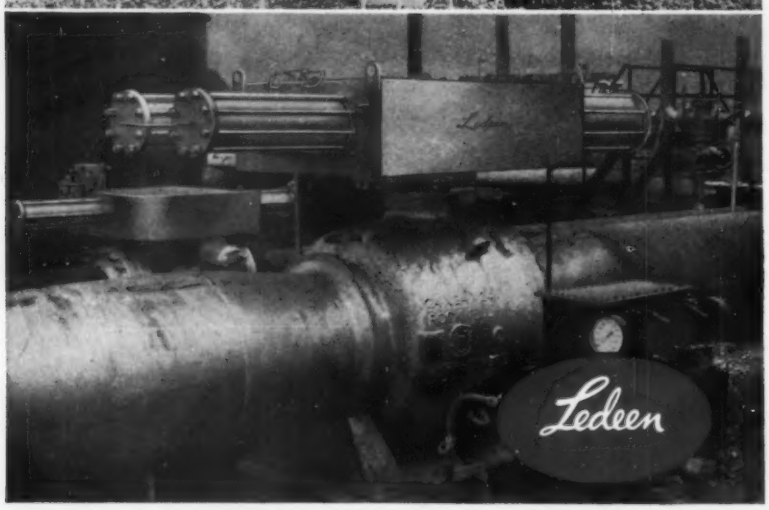

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CALENDAR

December

5-9..AGA Gas Air Conditioning Sales School—Nationwide Inn, Columbus, Ohio.

13-15..National Safety Council's Public Utilities Section Executive Committee Meeting—Statler-Hilton Hotel, New York.

1961

February

9-11..AGA Home Service Workshop — Cleveland - Sheraton Hotel, Cleveland, Ohio.

13-14..2nd Biennial Mid-Pacific Gas Merchandising Conference — Hawaiian Village Hotel, Honolulu.

23-25..PCGA, AGA, CGA Joint Public Relations Conference — Benson Hotel, Portland, Ore.

March

13-17..National Association of Corrosion Engineers Annual Meeting Hotel Statler, Buffalo.

15-17..New England Gas Association Annual Meeting — Statler-Hilton Hotel, Boston.

20-22..AGA General Management Section Conference—Frances-Marion Hotel, Charleston, S. C.

27-29..Mid-West Gas Association Annual Meeting — Sheraton-Fontenelle Hotel, Omaha.

April

11-13..AGA Sales Conference on Industrial & Commercial Gas — Prince Edward, Windsor, Ont., Canada

13-15..GAMA Annual Meeting—Boca Raton, Fla.

18-20..Southwestern Gas Measurement Short Course — University of Oklahoma, North Campus, Norman, Okla.

24-26..Southern Gas Association Annual Meeting—New Orleans.

May

8-12..AGA Operating Section, Distribution & Production Conference, —Sheraton Hotel, Philadelphia.

15-17..AGA MidWest Regional Gas Sales Conference — Edgewater Beach Hotel, Chicago

22-23..AGA Eastern Regional Gas Sales Conference — Pittsburgh Hilton Hotel, Pittsburgh

25-26..AGA Operating Section, Transmission Conference—Brown, Palace and Cosmopolitan Hotel, Denver.

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Thermally Thinking

True conservation

WHEN biting into a conservation theme, most chaps wheel into an analysis of energy requirements. Such an exercise seems unnecessary for our purposes. There are any number of projections around. Anyone can study these and zero on one that absolutely proves conclusions he wanted to reach.

The way I look at a natural resource, and natural gas in particular, is that if a resource just sits there, that's waste. If used intemperately, that's abuse.

As long as oil has been produced, and as long as it will ever be produced, gas is surfaced with it. Unassociated gas comes to well face with crude oil and, to some extent, dissolved gas is also produced. In early days of the oil game, most unassociated gas and the residue gas from oil field separators was flared to air. This was abuse. But petroleum was vital to the world's progress so it was impractical to cure an abuse at the expense of energy for the age of power.

Natural gas in the reservoir and natural gas at the wellhead mean nothing. The Good Lord may have put it there, but man has to do something with it. Thus, to my way of looking at it, gas industry pioneers who gave the world capability to move this resource from its resting and production points to markets for utilization by mankind were, in fact, true conservationists. They took a wasted and abused resource and put it to beneficial use.

At first, dry gas was the main factor in natural gas energy utilization. Residue gas was still blown to the winds. Then, gas industry pioneers learned how to take low pressure gas and how to treat sour gas so that it too could be sent through pipelines to markets and use.

Learning how to operate with residue gas so that it too could be pipelined and burned by all classes of U. S. energy consumers is a perfectly wonderful example of true conservation. And it was done by investor-owned, free-enterprise gas company people. It bears out Ralph Waldo Emerson's advice that if you will "Open the doors of opportunity to talent and virtue, they will do themselves justice and property will not be in bad hands."

And mark you well that these gas industry pioneers and true conservationists made these United States the first large consumer of natural gas. Further, although America's industrial life was based on an abundance of low-cost energy, and coal was the foundation of this abundance, any serious student of energy relationships will tell you that an abundance of petroleum and natural gas have been responsible for the most recent dramatic growth of our standard of living and our comfort.

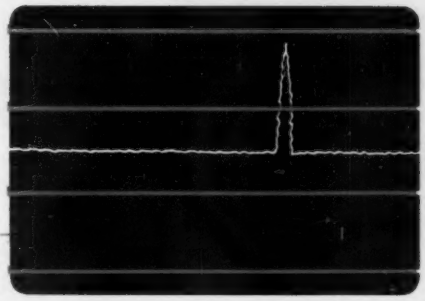
Getting right down to boilers (where the soot-and-smoke set likes to congregate), is natural gas being wasted or abused there? Well, what is real conservation? Is it saying that natural gas can only be utilized for domestic purposes to preserve an alleged "short supply"? Or is it using natural gas under boilers that will produce electricity, and steam heat homes in some cases, and at the same time conserve air around us as a breathable vapor, and conserve the beauty of buildings, cities, and the sky above us. In one actual installation, use of natural gas under two boilers would essentially eliminate 15,000 pounds of fly ash and 42,000 pounds of sulfur dioxide from being dumped every day into the atmosphere of a particular city.

I'll say that we should leave the conservation of natural gas to the gas industry. Gas companies have some $22 billion invested in gross plant. The fact that they had to go to the most hard-nosed bankers and investment houses in the world to get money for this plant, leaves me thinking there are pretty good odds that we will not see the last puff of natural gas energy from a well in any foreseeable future.

Again I draw on Emerson to adequately express a reminder I will leave with the Ol' King-coal conservationists and others who would have government hand them riches—"In a free and just commonwealth, property rushes from the idle and the imbecile to the industrious, brave, and persevering."

J. Fred Ebsen
EDITOR

The Reflectoscope . . .



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	.156″	7.25
	.188″	8.64
	.219″	10.00
	.237″	10.79
6⅝	.156″	10.78
	.188″	12.89
	.219″	14.97
	.250″	17.02
	.280″	18.97

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GAS HIGHLIGHTS

The energy growth equation

Almost 20 per cent of the nation's primary energy is used to provide electricity. Use of electricity is growing twice as fast as the overall energy market. Current sources of produced electricity: Coal, slightly over 50 per cent; water power, less than 20 per cent; natural gas, over 21 per cent. But natural gas is fastest growing source. Gas may generate over 33 per cent of greatly increased generation capacity by 1970. Source: Petroleum Dept., Economics Div., Chase Manhattan Bank.

IGT battles distribution costs

Gas technology research may hold the key to decreasing the cost of gas distribution, says IGT's Dr. Martin Elliott. Increasing efficiency (hence costs) of distribution systems is vital. Gas distribution represents 65 per cent of total cost of gas to consumers. Major projects IGT is researching with this objective in mind are: two new sonic leak detection methods, an internal sealant for leak repairs in mains; more economical terminal storage methods for natural gas, etc. Also in IGT's works: development of natural gas fuel cells. Construction of prototype fuel cell batteries will begin in 1961. The natural gas fuel cell power pack producing about 10 kw will probably be no longer than a gas furnace. Its heart will be a number of thin, high-temperature cells, generating electricity by direct electrochemical reaction.

Jet engine-compressor previewed

On Nov. 15, a closed circuit TV press conference gave a simultaneous showing in Washington, New York City, Chicago, Houston, and Los Angeles of the world's first aircraft jet-driven gas turbine being operated to provide stationary industrial power. The unit, Cooper-Bessemer's RT-248 10,500-hp gas turbine went into service at the Possum Trot, Ky. compressor station on Columbia Gulf Transmission Co.'s system. Jet aircraft engine (natural gas-fueled) powers a specially designed power turbine which turns a centrifugal gas compressor.

Just out of the cutting room

AGA offers a brand new 17mm sound-color film on flame propagation. Shot to promote employee safety while working in or around flammable mixtures, the 20-min. movie shows how flame travels through mines, pipelines, sewers, electrical conduit and "explosion-proof" electrical fixtures.

NI-Gas to grow

Northern Illinois Gas Co.'s construction program for the next four years is likely to aggregate $200 million, according to V-P C. J. Gauthier. The integrated gas company will spend most of this for gas distribution expansion. Some $38 million is earmarked for new storage operations.

55 towns to get new gas service

Just prior to election day and prior also to serious snow flies, 55 towns in Minnesota, Wisconsin and Iowa got good natural gas service via Northern Natural Gas Co. Heavy construction on Northern's vast system permitting the connections, kicked off in July. Added were 644 miles of pipeline and 20,000 compressor hp. Northern's gas supply and system now fuel some 500 communities. Last year, service was extended to 43, including the important metropolitan complex of Duluth-Superior.

The plus side of area pricing

Pulse monitoring among gas guys indicates most feel FPC's area prices go a long way toward clearing confusion that now surrounds gas prices. Many think the opinion and guidelines will stand up in court. They are hopeful that an idea of what producers can expect to sell gas for will encourage exploration and drilling. Many wise heads think the new pricing concept is intended to allow integrated gas companies to participate in area pricing for gas-company produced gas. They are fairly sure that at least the FPC-prescribed max. rates for existing service for their gas applies.

With life and property at risk day and night, only the very best precaution is good enough. In odorizing natural gas for maximum safety—odorants of consistent quality are your best protection. And Oronite will not market or supply an odorant product which does not conform—*consistently*—to the *highest standards of safety established by the gas industry.*

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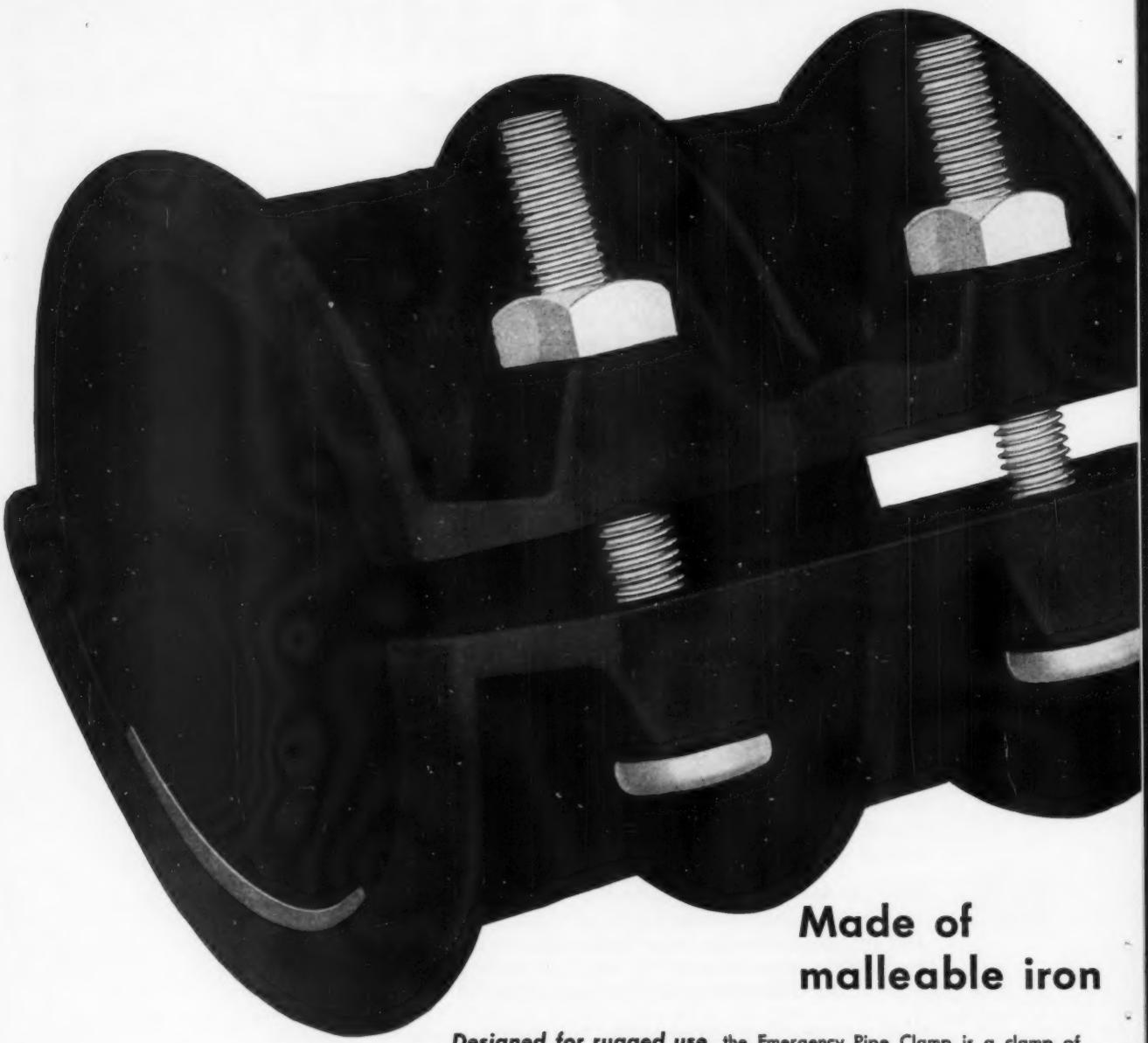

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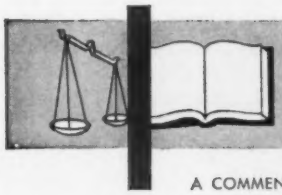

Regulatory and Legislative Trends

A COMMENTARY ON NATIONAL AND STATE DEVELOPMENTS BY AN EXPERT IN UTILITY LAW

FPC goes into orbit

THREE Federal Power Commissioners have announced a successful blast-off to place the satellite of producer prices in a history-making orbit. One of the most important policy decisions in the 22-year administration of the Natural Gas Act was made by FPC in conjunction with the Phillips Petroleum Co. rate increase case. The commission issued price guidance levels by geographical gas producing areas in the nation. Two prices were established for each area; a price applicable to new contracts above which FPC will not certificate new gas sales without a justification of the price, and a price for existing contract gas that will cause a suspension when exceeded by a proposed rate increase.

The FPC reasoning, based on five years of struggle with the difficult problem of natural gas producer pricing, is brilliant and convincing. A summation should be helpful to managements in the three segments of the gas industry —producer, pipeliner, and retailer.

• FPC producer pricing policy

The FPC asserted:

"With the full proceedings before us involving the largest independent producer of natural gas from the standpoint of sales in interstate commerce, the time has arrived when the commission can express its views on the policies which must be followed in order to regulate the rates of independent producers of natural gas in a sane, sensible and effective manner. Heretofore, we have been confined to the record of particular cases, which generally did not afford a basis for employing the experience which we have acquired in the many cases which have come before us, including, now, this one.

"Experience of the commission in this case, as well as in many other producer rate cases during the last five years, has shown, beyond any doubt, that the traditional original cost, prudent investment rate base method of regulating utilities is not a sensible, or even a workable method of fixing the rates of independent producers of natural gas. The fact that, in this case, we can, by making numerous arbitrary allocations and estimates, arrive at a calculated unit cost of gas does not prove to anyone's satisfaction, including ours, that we have thus solved the problem of fixing prices for natural gas sold by independent producers. We recognize that the use of this method for regulating utilities provides only some possible aid toward solving, but not the answer to, the problem of fixing producers' rates.

"Producers of natural gas cannot, by any stretch of the imagination, be properly classified as traditional public utilities."

* * *

"A natural gas pipeline, under our regulation, usually has a fair opportunity to earn a fair rate of return, but such is not necessarily the case with a producer. The pipeline investor is reasonably assured of the financial feasibility of a project before any funds are expended for construction. The pipeline constructs facilities only after the issuance of a certificate of public convenience and necessity and reasonable assurance of fair rates. The producer must invest his funds prior to ascertaining whether he will have anything to sell or whether, if he does, he will have an adequate market. Thus it is clear that in regulating producers, we are faced with problems entirely different from those presented by an ordinary public utility. Furthermore, to fix rates of gas producers simply by allowing a return on investment or rate base will penalize the efficient or fortunate producers and will unduly reward the inefficient or unfortunate producer."

Virtually the only situation in which the investment would have a real relationship to the return is where the producer has purchased developed acreage at a current fair price. Otherwise the determination of the cost of a producers' assets upon the happening of a certain event will produce inequitable results. Under the cost rate base method the gas producer who first takes the risk in an area and proves it productive will get the least return, for he will pay less for his rights than those who come in later after the area is proved.

One of two commodities produced with the same equipment and processed to varying degrees prior to sale is usually the case. The price of the second commodity, oil, is unregulated. So is that part of the gas, which is sold in intrastate commerce or other transactions not subject to FPC jurisdiction, as well as the products which are extracted prior to shipment. Thus FPC is faced with the extremely difficult problem of allocating costs between the regulated and unregulated products. The record showed that none of the experienced and intelligent experts on this problem proposed any allocations which were acceptable to other experts. Every method of allocation advanced was shown to have some element of guesswork or to ignore facts.

FPC added that in the case of the producer, the amounts involved in the allocations of costs are great and extremely difficult to make. The result is that a producer ac-

tually could become bankrupt, or could make enormous profits, depending merely on the methods of allocation used.

FPC said:

"Further experience may enable us to refine and improve our allocation methods, but it is clear that the calculation of the unit cost of gas is, and will be an inexact, complex, unsatisfactory, and time consuming process, fraught with controversy. The result finally reached may give the illusion of accuracy since mathematical processes are involved, and a definite price per Mcf is the final result. But such a result must be tested against the realities of the market place. Thus, prices calculated solely on the cost rate base principle cannot be accepted if they are higher than a buyer will pay, or lower than a seller will accept."

* * *

"Ridiculous results will be reached among the great number of producers and owners of interests if costs should be the only basis for regulation. In unitized fields many single wells have as many as 50 part owners. If cost is to be the sole criterion, each owner would be required to show his costs. Any other course would presumptively be unlawful and confiscatory as to those owners whose costs were not shown. Under the rate base method, Phillips' new rates could not be said to be fair for co-owners. Thus from each well in the United States every Mcf of gas might have a different price tag. Gas from one well might well range in cost from 1 cent to 10 dollars per Mcf."

Consider the interests of the many royalty owners who are paid a percentage of the price received for the products. If cost is to control price, landowners would lease only to the producing companies that can show high costs. Thus low cost producers who must replace diminishing resources would find it increasingly difficult to obtain new leases. In keeping with such a showing of higher costs FPC must bear in mind that almost half of the markets for gas in this country are not under its jurisdiction. This gives many producers substantial room in which to manipulate their sales in order to sell only in interstate commerce the gas with the highest production costs.

- **The administrative burden in using cost rate base**

Inherent in regulation of natural gas producers on a cost basis is the administrative burden of having a full cost rate case for each of the thousands of independent producers. The uncertainty of the business assures that many producers will have substantial cost and revenue fluctuations from year to year and, if cost were the commission's only criterion, the interests of both consumers and producers would require a full cost hearing repeatedly for each producer. Thus adherence to the original cost rate base method of regulation results in the necessity of a full scale, company-wide cost study of a producer in order to determine whether the price contained in any one contract represents revenue to which the company is entitled.

An illustration of the administrative impossibility of separate determinations for all producers' rates is that there are over 3000 independent producers with rates on file with FPC. The producers have filed 11,091 rate schedules and 33,231 supplements. Currently, 570 of these producers are involved in 3278 producer rate increase filings now under suspension and awaiting hearings and decisions. The number of completions of independent producer rate cases per man-year during the years following the Phillips decision indicate that nearly 13 years would be required for FPC to dispose of the cases pending. Within this 13-year period an additional estimated 6500 cases would have been received.

If the commission's present staff were tripled, it would not reach a current status in independent producer rate work until 2043 A.D.—more than 82 years from now.

- **Fair field price**

FPC observed that:

"In fact, rigid adherence to the rate base method will, in many cases, price the producers' gas completely out of the market. This fact is now abundantly clear: Regardless of variations in allocation methods, allowance for incentives, and other disputed factors, computations of the cost of natural gas which have been presented in the many cases before us, show the natural gas has been, in almost all instances, substantially underpriced."

* * *

"It follows that effective regulation of the price of natural gas must be on some more manageable plan than the rate base method. Thus it is clear that the better method would be to establish fair prices for the gas itself and not for each individual producer. While the evidence here is sufficient to allow a determination on a mathematical basis of the revenue Phillips requires, it appears that the ultimate solution to producer regulation will be in the determination of fair prices for gas, based on reasonable financial requirements of the industry and not on the particular rate base and expenses of each natural gas company.

"We are, simultaneously with the issuance of this opinion and order, promulgating a policy statement setting forth rate guidance levels for various producing areas of the country."

"This schedule of prices is only for guidance and does not constitute any determination of just and reasonable rates and will not foreclose any person from justifying a particular rate in any area. Prices now shown on this schedule will no doubt be revised from time to time, as experience indicates they should be. Other revisions and refinements no doubt will also be made, such as changes in the boundaries of the areas, provisions for variations in physical qualities of the gas, terms of delivery, and other factors.

"Our ultimate objective will be to set prices in all producing areas which will be adequate to maintain the gas supplies needed by the consumers of the nation, but at prices that are no higher than are necessary to accomplish that purpose."

If this plan of gas producer rate regulation is contested in the courts, FPC should win in the United States Supreme Court, because FPC's logic and expertise are compelling. Congress, however, can provide a faster final answer by passing legislation authorizing FPC to fix producer gas prices by areas based upon the reasonable market value of the gas. ■

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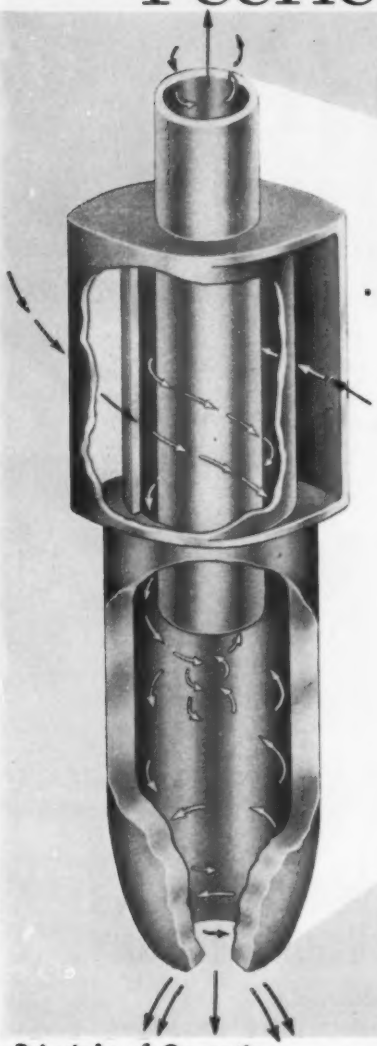
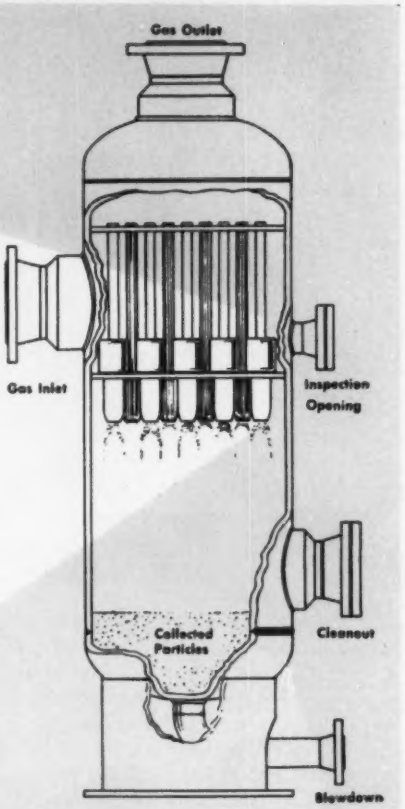
Another in a complete line of Peerless Scrubbers

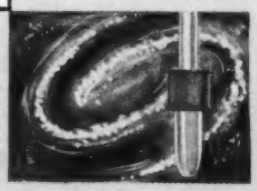
Peerless Dry Scrubber



. . . utilizes multiple cyclones to achieve high efficiency removal of troublesome dirt and liquid.



PEERLESS CYCLONE TUBE CONSTRUCTION . . .
The cyclone elements are constructed of an alloy combining abrasion and corrosion resistance with shock-resistant qualities needed for reciprocating compressor station requirements.



Principle of Operation

The Peerless Dry Scrubber consists of small diameter cyclones in parallel to provide the centrifugal force necessary for efficient small particle removal at high pressures. Peerless Dry Scrubbers are offered in a complete range of sizes and working pressures to fit any scrubber requirements. Also available are compartmented scrubbers to handle the problems of widely varying flows with only one vessel where multiple scrubbers have been required heretofore. Write for descriptive literature.

Provides these important advantages

1. Efficient removal of dust and liquids.
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4. Requires no oil filling or settling tanks.
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Engineering Assistance Available: Peerless makes all types of Scrubbers, including Dry Scrubbers, Oil Bath, both a fixed contactor type (Swirl-Gas Cleaner) and a revolving contactor type (Scrubosphere). In addition, Peerless makes Gas Filters. Ask us for recommendations on the type Scrubber best suited to your application.

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TECHNICAL TRENDS

By GUY CORFIELD
Professional Engineer,
Los Angeles

The gas lubricated bearing

While it is not opening up a market for fuel gas, the gas or air-lubricated bearing is an interesting example of modern ingenuity and development. The principle is that the rotation of the shaft in the bearing draws in a film of air which provides both support and lubrication. Bearing clearances and gas film thicknesses are a few ten-thousandths of an inch. As the temperature rises or the shaft speed increases, the gas film improves as its viscosity increases with temperature, and more gas is drawn in to increase the film pressure as speed increases. Thus this type of bearing is self-compensating for temperature and speed, unlike conventional lubricated bearings. Only wear is at start and shut-down, when rotation is not fast enough to provide the air cushion, so the bearing if otherwise effective should have practically infinite life.

There is considerable research being done on this type of lubrication, and hints that it is being used experimentally for light duty special purposes where conventional bearings would fail because the lubricant would freeze, evaporate, deteriorate from nuclear radiation, etc. It is reported to be commercially developed by an English company for a line of special purpose pumps and compressors.

Offshore drilling for oil

The search for and production of oil in tidelands and offshore areas, which had its major impulse off the Texas and Louisiana coasts, has now spread world wide though remaining very expensive in comparison with land operations. Beyond the U. S., wells have been drilled in the Persian Gulf, off Honshu Island in Japan, and between Venezuela and Trinidad. Preparations are under way in the North Sea off Holland. Back in the U. S., drilling is active off the California coast. Also a number of wells are planned along the Canadian side of Lake Erie.

The cost of drilling and equipping wells offshore, or merely drilling dry holes, is in almost all instances several times that of onshore wells. Figures vary somewhat depending on location and circumstances, but are invariably higher for offshore vs. onshore by anything from about 90 to 490 per cent with an average of about 300 per cent. This is not surprising, as the problems through the entire series of operations can be readily visualized.

Many ingenious methods are being developed. Typical are two recently reported means of storing the produced oil in under-water containers until sufficient is accumulated for pickup by tanker.

One method uses a grid of very large diameter steel pipe. It rests on and is secured to the ocean bottom, but can be moved as desired. The perimeter piping is used for oil storage only but the center sections can contain either oil or salt water for ballast to offset buoyancy when only partially filled with oil. If the grid is to be moved, oil and water are pumped out so that it can be floated and towed to a new location and again sunk. Filling or emptying is through connections to surface platforms. Another method is somewhat similar but uses a nest of large rubber bags, restrained from floating by a net of nylon rope secured to piles driven into the ocean bottom. A proposed installation is 20 bags with a combined capacity of 25,000 bbl. In this design filling and emptying is through flexible tubing terminating at floats on the water surface. Buoyancy of the bags will keep them from actual contact with and deterioration by the ocean bottom. They will have to be filled by pump but will, at least in the case of light liquids, empty themselves because of surrounding hydrostatic pressure.

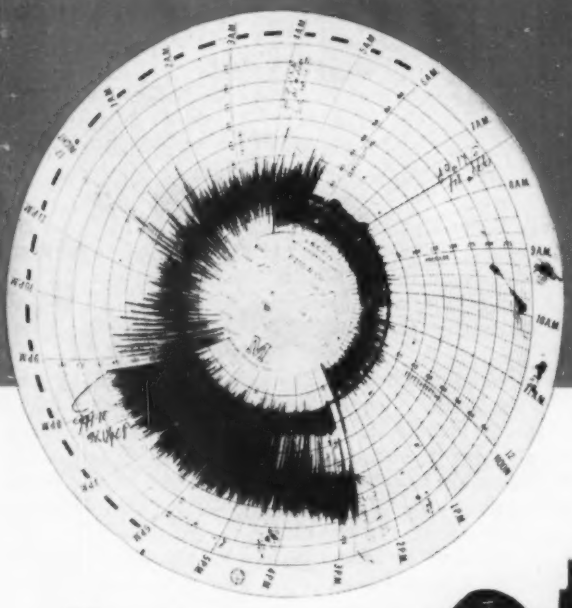
Heat storage

It is recognized by proponents and critics alike that the electrical heat pump loses its capacity on the coldest days. Then, it has to be supplemented with electric resistance heat. This develops unfavorable load characteristics for the electric utilities. A means of storing heat on the premises with economy of both cost and space, that could be generated at off-peak hours and recovered when needed, would be very helpful.

A joint heat pump committee of the Association of Edison Illuminating Companies and Edison Electric Institute has been exploring this possibility through a research project with Battelle Memorial Institute and Comstock & Wescott Inc., reportedly without any practical success so far. The most promising heat source is said to be high temperature storage charged by off-peak resistance heat, using media such as fused salts and refractory oxides. Next is condenser-side storage, possibly in paraffin wax. Third is evaporator-side storage, making possible use of the sensible heat and the latent heat of fusion of water.

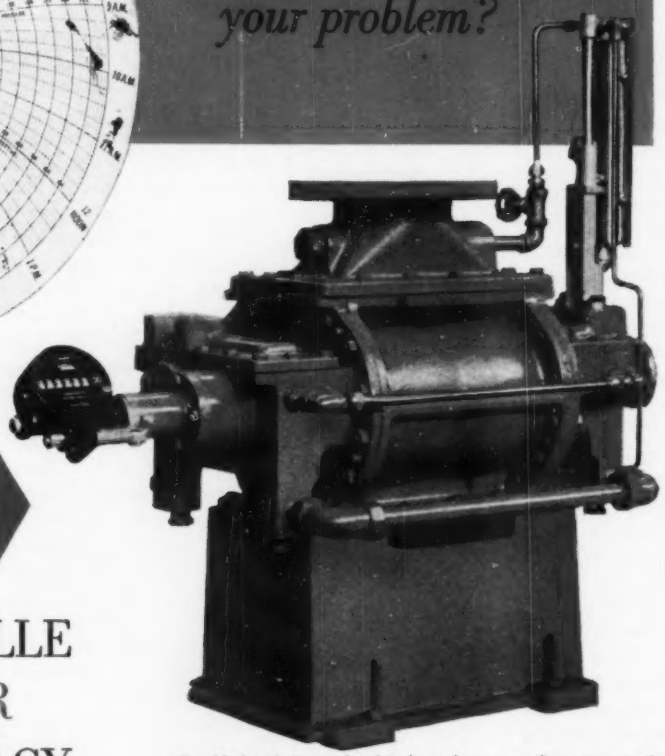
Storage systems were also classed in three ways as heat of hydration, as when substances combine with water; heat of fusion, as when a material changes from a liquid to a solid; and heat of chemical change, as when hydrogen reacts with atmospheric oxygen.

There have been similar investigations by engineers interested in solar house heating, to provide stored heat for nights and cloudy days. They have included the evaluation of bulky storage such as large volumes of sand or pebbles, pools of water (such as swimming pools), etc.



Are "paint brush" charts like this your problem?

Here is your easy-to-read solution.



Troubled with "paint brush" charts from an orifice-type recording meter used for testing wells, Shell installed the R-C Rotary Meter and now obtains clear and accurate data recorded on a punched tape along with other well test information.

ROOTS-CONNERSVILLE ROTARY GAS METER MAINTAINS ACCURACY AND READABILITY, EVEN WHEN FLOW RATES FLUCTUATE RAPIDLY

At Shell Oil offshore installations in the Gulf of Mexico, the oil and gas output of 16 or more wells passes through a single gathering platform before being piped to gas transmission lines, storage tanks and refineries. The gas flow from each well must be measured at intervals so that oil-gas ratios can be determined. Pressure in the well to be measured is reduced to 40 psig for metering, the oil separated, and the gas piped into a 4 x 8 high-pressure R-C rotary positive displacement meter. After a selected period of testing, this well is returned to normal operation and the next well switched in to test. The operation is continuous and automatic on whatever time cycle is chosen. The orifice meters previously used for measuring gas flow recorded the fluctuation in flow in such a way that instrument charts were difficult to integrate. Maintenance requirements were high and frequent chart readings necessary.

The R-C rotary meter accurately measures the fluctuating flows from each well and this accuracy is unaffected by continuous fluctuation. Well pressures range from 50 to 2000 psig. Direct readings, corrected to standard conditions can be taken from the meter or transmitted remotely. No stand-by personnel is needed to service the meter or read charts. Repetitive flow readings can be obtained to determine accurate oil-gas ratios.

R-C rotary positive displacement meters were selected as a result of field tests, which proved them most accurate in measuring the wide range and rapid fluctuations in flow rates.

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WASHINGTON

By NEIL REGEIMBAL

GAS Washington Bureau
1093 National Press Bldg.
Washington 4, D. C.

Post-election spotlight on newness

A WHOLE range of new patterns, policies, people and problems facing the gas industry in Washington is being brought into sharp focus in the calm of the post-election period.

In about a month a new Congress and a new Administration with a new chief executive will start on a new bureaucratic "adventure." New proposals, new answers, new methods of dealing with business, labor, economics, will result.

The gas industry better have its swords freshly honed, its shields polished, and its diplomacy handbooks carefully studied. Fresh approaches by the industry to solving its old problems will be required.

It's not only the new Congress and Administration which will produce a new era of gas industry dealings with the federal government, but new faces on the Federal Power Commission and in the courts.

The area pricing policy, announced by FPC in late September, clearly illustrates the new era with which the gas industry will have to cope. The pricing guide is being modified, clarified, and detailed in a series of additional policy statements still being issued. More important, this process of change is likely to be stepped up, rather than reduced, as the months wear on and as the composition of the commission changes.

The pricing policy announced by the FPC was designed to be changed—but not as drastically as now appears likely. Since it is only a guide, each new commissioner or shift in FPC staff makeup could easily bring far-reaching changes.

Beyond this, the policies as soon as clearly applied to a producer rate case, are certain to be appealed to the courts—where new changes are assured, and outright rejection is a possibility.

Gas industry representatives in Washington have expressed only wary, half-hearted acceptance of the new area pricing scheme and considerable disillusionment at the prospects for the future of the plan. All will say it's a "step in the right direction." But the confusion, complaints, and doubts that follow this statement point the way to long years of hard work and controversy ahead if it is to work.

All segments of the industry have their doubts and their outright complaints about the new policy. Producers in many areas claim the prices set are too low, and point out that standard cost data will more than likely be required before there is any relief. Thus, they're not far ahead of where they were a year ago, they moan.

Pipelines are primarily questioning now how the area pricing system will be applied to them. In spite of Chairman Kuykendall's repeated statements that he personally favors applying the same rules to pipeline-produced gas as to independent production, they have serious doubts that this will ever be accepted. They point out that in several cases, including one involving El Paso just before the policy statement was issued, the commission used the old (and too low, they say) rate of return formula.

Distributors perhaps best put their finger on the continued weakness of federal control no matter how it is accomplished. They seriously question whether area pricing can produce any reversal of the trend toward intrastate gas sales without boosting consumer prices so high that the competitive position of gas will be hurt.

The advent of the FPC area pricing approach has had two effects on natural gas legislation. First, supporters of a measure to drastically limit federal controls of independent producers have never been more discouraged. They say now there is no chance of even getting serious congressional study of a gas bill for several years while the area pricing method is worked out and tested in the courts.

Although they still intend to try for a bill next year, mostly to keep the subject alive, they'll have to produce an entirely new approach to the bill to take into account the area pricing attempt.

This bill will be introduced into a Congress much more changed from the past eight years than appears on the surface. True, most of the old names will continue to head the news as committee chairmen and leadership generally remains unchanged. But the Congress which is chosen in a presidential election year carries with it into office the controversies, passions, and results of the bitter battles for the White House. The issues which are developed during

Continued on page 128

NEW...

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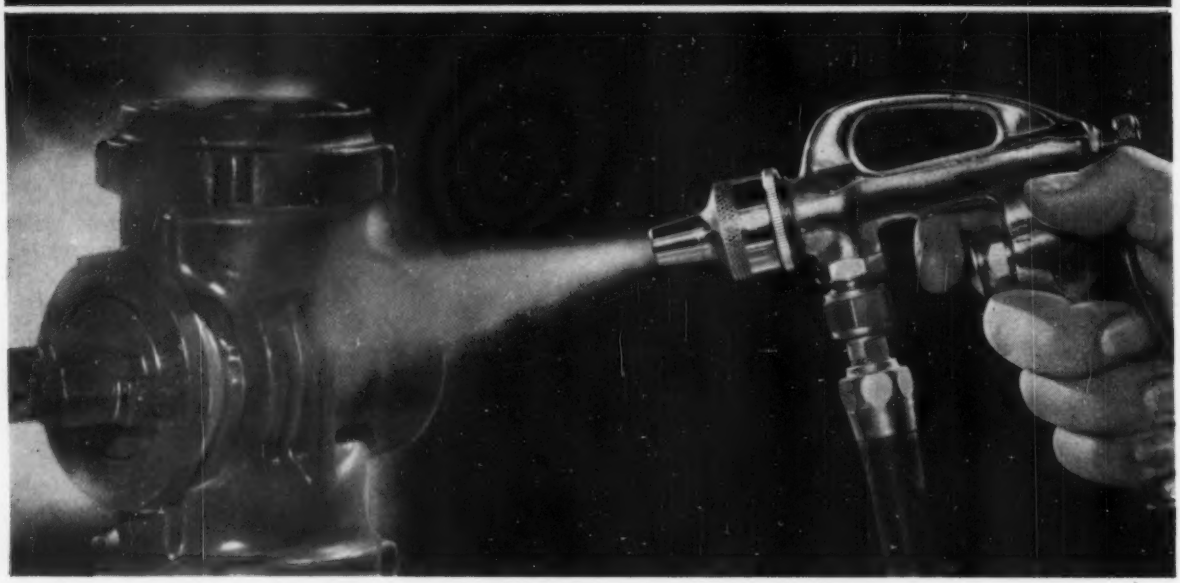

Now from 3M, a 100% epoxy resin powder you can spray on fittings, couplings and other hardware for positive corrosion protection. Of fine talcum powder consistency, "SCOTCHKOTE" Brand Protective Resin No. 101 applies easily with a flocking type spray gun. When sprayed on parts pre-heated to 430°F., it liquefies on contact, flows into a smooth even coat, then cures to a strong impact-resistant finish in less than 60 seconds.

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Now, with "SCOTCHKOTE" Protective Resin 101 you can add a 100% epoxy *factory-controlled* shield of lasting protection on odd-shaped valves, and couplings. And best of all, the "in the ground" costs of objects protected with "SCOTCHKOTE" Protective Resin is often less than that of less efficient coatings.

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3M COMPANY

How to spot a phony

By MARSHALL E. PARKER
Consulting Engineer
Houston

THE field of corrosion control has within it much of the mysterious. Executives are often called upon to make decisions relative to the use of processes, materials, and techniques with which they are not familiar. Small wonder, then, that this is a fertile field for quacks and charlatans, for the purveyors of miracle devices, magic compounds, and wonderful new scientific discoveries.

How to detect these phonies? How, without an expert knowledge of the field, to detect the charlatan, and separate the outright fraud from the merely untried new product? The following set of rules may be useful for spotting the phony —in the field of corrosion and also in many other areas.

(1) Beware the "secret process or material." This does not mean that legitimate manufacturers always disclose the details of the processes by which they manufacture their products—but, with a very, very few exceptions, they do publish the detailed analyses of the products, and the detailed descriptions of any processes which they have for sale. An example is cathodic protection; mysterious though this process may sound when first encountered, there are hundreds of published articles and several books which discuss in great detail all of the design methods, materials and equipment used, formulae, etc., etc. But when the gadget you're supposed to put in your water line operates by a secret principle—look out!

(2) Be wary of the material or device with an unfamiliar name. Naturally, there is nothing wrong with a trade name for either a material or a device. But no reputable coating manufacturer, for example, makes any secret about just what his material is; he calls it by his trade name, but he identifies the material. The one to be wary of is the compound which contains some mysterious substance whose name, spelled with a lower case letter, may end in "-onium," or some such combination of letters, so that it sounds like a newly discovered element. This approach is of a piece with the secret process approach outlined above. You are simply being asked to believe something for which there is no corrobatory evidence anywhere in the literature — because nobody has ever heard of the stuff before! If it is a valid new discovery, there will be plenty of word about it in the literature.

(3) Look out for obvious technical errors in the sales pitch, particularly in any printed literature or any part of the sales talk which is apparently officially sponsored, rather than just the ideas of the pitchman. An example is that of a certain "water conditioner" which "lowers the pH of the water, thereby rendering it less corrosive." Obviously the writer of this blurb doesn't know what he is talking about, so why should one believe all the wonderful things he has to say about his gadget?

(4) Shun, as a plague, the pitchman with a persecution complex. "The big magazines won't accept our ads; they're afraid of antagonizing their big established advertisers." Do any newspapers refuse advertisements for competitive foreign cars, for fear of antagonizing General Motors? This howl of persecution is heard more often from the medical quack than from the operator in the field of corrosion, but it is not unknown here. Tales are told of attempts to buy up and conceal these marvelous new inventions, in order to protect old, established industries from devastating competition; there are stories of unfair competition, of price-cutting, of political influence; and even occasional dark whisperings of violence and threats of violence.

When the salesman complains that everybody is "down" on him and his product, join the majority —there's a reason!

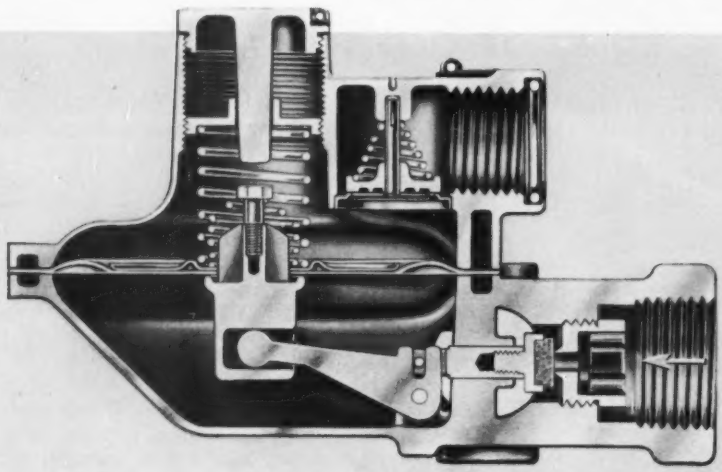
(5) Another one of which to be suspicious is the completely unexplained accidental discovery. "We don't know how this works, but we know it will solve your problems." By thus claiming complete ignorance, either of the principles on which his product works, or even of those which hold in the general field, this operator seeks to avoid the embarrassment which might accompany having his lack of knowledge exposed. It is, however, an old and well-known trick, and is a very reliable clue to the fraudulent nature of the gimmick. The extremely small number of truly useful accidental discoveries which are made by unqualified persons never amount to anything until they reach the hands of those who are capable of exploiting them—so wait until this group comes along with the idea.

(6) Finally, there is no feature more characteristic of the quack

Continued on page 70

The Leader Leads Again...

FISHER ANNOUNCES A NEW LOW COST SERVICE REGULATOR



SERIES

S250

HANDLES 99% OF ALL DOMESTIC INSTALLATIONS

Good news for the gas industry! Fisher now offers a new domestic service regulator designed especially for installations requiring 250 CFH regulating capacity or less. The new Series S250 is not only lower in cost due to the compact design, but it meets the requirements of 99% of all domestic installations.

Capacity-wise, the Fisher S250 service regulator is the companion of the compact meters now available. This enables you to make a LOWER COST, COMPLETE customer service.

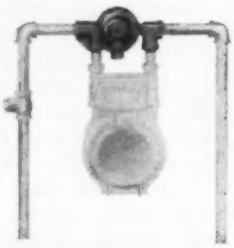
The Series S250 consists of Type S251 standard regulator with compact screened vent (no internal relief valve) and Type S252 with full capacity internal relief valve and large weather-proof vent.

Aluminum body and lower casing are one piece construction. The "elbow" type body reduces your installation costs.

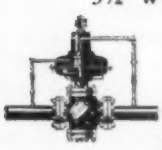
Design features body sizes ¾ and 1" with orifice size ⅛, 3/16, ¼, ⅜".

Capacity 250 CFH or more with or without full capacity internal relief. Suitable for upstream pressures up to 100 psi and springs available for reduced pressures from 3½" W.C. to 15" W.C.

The S250 meets the growing demand for a compact, low cost service regulator to match the small meters now being put into service. It simplifies installation problems and lowers installation costs.



The S250 regulator with integral meter bar provides the ultimate in low cost piping hook up.



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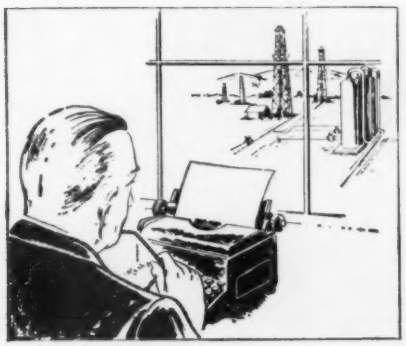
SINCE 1880



THE GASSING GAME

By **JIM CLARK** • Gas & Oil Consultant, Houston

NO one has come anywhere near exciting the petroleum producers, particularly those who seek natural gas to supply an expanding market, as did David R. Searls, general counsel for Gulf Oil Corp., recently in Miami.

Boiled down to its essentials, Searls said that in the next 10 years somewhere between 18 and 21 trillion cu ft of gas must be found to meet anticipated market requirements.

He qualified that a little by saying that such a program would be necessary providing producers can get what they consider a reasonable price for gas. He didn't say what he considered a reasonable price, but he did intimate that what they are getting now is not sufficient to justify the program he had in mind.

Searls said that to fill the public's minimum requirements for natural gas in the next 10 years, some 625,000 wells would have to be drilled. He went further to add that if the same reserve ratio that exists today is to be maintained, the number of wells would have to be around 930,000.

In effect, Searls, something of an outstanding authority on the subject of natural gas since he has spent more than the average amount of time before the FPC, was saying that instead of drilling 51,000 oil and gas wells as we will do this year, that we will have to drill at least 62,500 and probably 93,000 per year in the next 10 years.

Commenting on this later in Los Angeles, Michel T. Halbouty, outstanding Houston geologist and petroleum engineer, raised the question as to why something was not starting on this program now. In fact, Halbouty went a step further and chided Searls' company and other major importers for selecting this particular time to be retiring and laying off geologists, geophysicists, paleontologists, and other earth scientists whose efforts will be necessary to find the gas (and oil) men like Searls are saying we will need.

What Halbouty said specifically was that now was a good time for oil importers to take the extra dollar a barrel they are realizing on imports (above domestic oil prices) and put it into exploration for future domestic needs.

That, he said, would be even better than passing it on to consumers (which is not being done either) because it would revive and revitalize a sagging petroleum industry. Halbouty noted that thousands of earth scientists have lost their connections lately and that many independent oil operators have their backs to the wall. He simply couldn't understand why those who know most about future requirements (the large international companies) are willing to stop hunting domestic sources of oil and gas when they have already made extra profit with which to stimulate the search.

Of course, if the $1.7 million daily (which represents $1 a barrel extra profit for total imports) could be put to work in oil and gas exploration, there would be little need for Searls or anyone else to worry about future gas supplies.

All it takes to find oil or gas is for someone to have the money, men, and materials with which to search for it.

It might not be practical for the importers to put their spare $1.7 million a day into an oil and gas search. (Incidentally, major company economists are also saying we must find at least 52 billion bbl of oil in the next 10 years to keep abreast of our present energy position.) Even if they did so, the total over 10 years would amount to only a fraction of the investment Searls anticipated.

Every spare dollar of extra profit from imports over a period of 10 years would still amount to less than $7 billion, assuming that import controls will prevent much higher imports than we now have.

And the Searls program calls for an outlay of some $126 billion in 10 years!

This leaves the question open about the other $119 billion.

It is right at that point that it might be easy to understand why Searls thinks producers are entitled to enough income from their gas to pay for the search that is necessary to keep producers, transmission companies, and distributors in business, and consumers adequately supplied. ■

NO PLACE FOR SISSIES

MOTOROLA 2-WAY RADIO TAKES A BEATING...
because it's built to take it!

A 2-way radio is a precise, complex electronic instrument. But unless it is *rugged* too—unless it can shrug off jolts and vibration and come back for more—it just can't go to work in the oil fields.

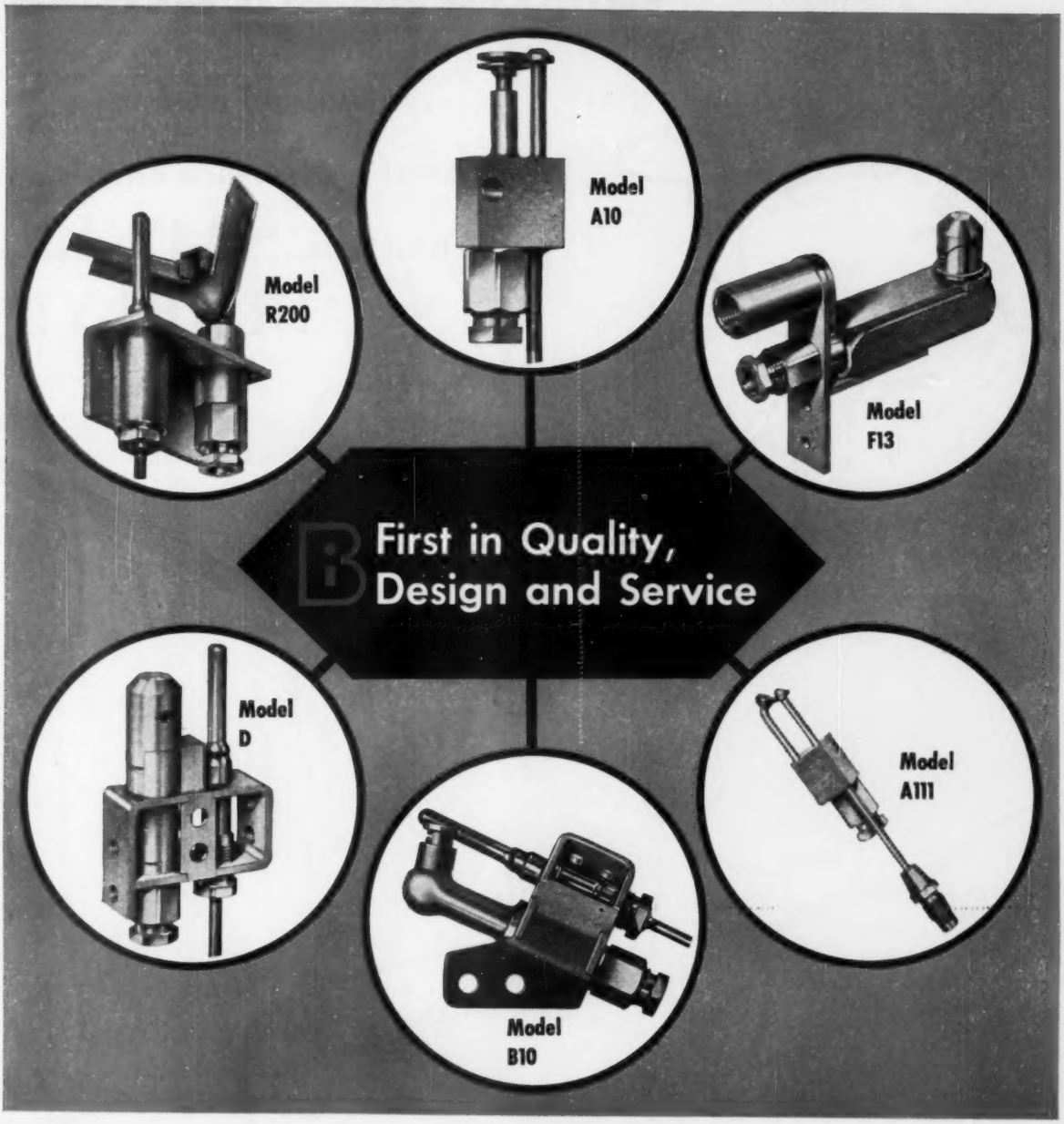
Motorola engineers *design* a radio to take it. Extensive field tests *make sure* it's no sissy—Motorola literally beats the "bugs" out. Then a tough, rigid quality control setup *keeps* them out.

This kind of consistent leadership in research, development and engineering has led to a radio that will stand up to rough treatment and still deliver dependable service—day after day. You'll see *why* when you check with your local Motorola representative—he'll give you all the facts. Write:

MOTOROLA 2-WAY RADIO

Motorola Communications & Electronics, Inc., 4501 Augusta Blvd., Chicago 51, Illinois • A Subsidiary of Motorola Inc.

BASO® PILOT BURNERS



Whatever your gas product application, there's a BASO pilot burner designed to meet your most exacting requirements. Illustrated here are only a few of the many models of pilot burners that can fit your gas appliances—central heating systems, water heaters, boilers, floor furnaces, gas ranges, space heaters, clothes dryers, and others.

BASO pilot burners are recognized throughout the gas industry for their quality, dependable performance and ease of installation. Each general type has a variety of tips, mounting brackets and replaceable orifice fittings for different fuel gases to ensure a satisfactory installation—vertical, horizontal or inclined mountings.

For complete information on BASO pilot burners, call your BASO sales engineer, or WRITE

BASO INC. Milwaukee 1, Wisconsin
Dept. SC-5

"Pioneers in thermoelectric gas controls"

another

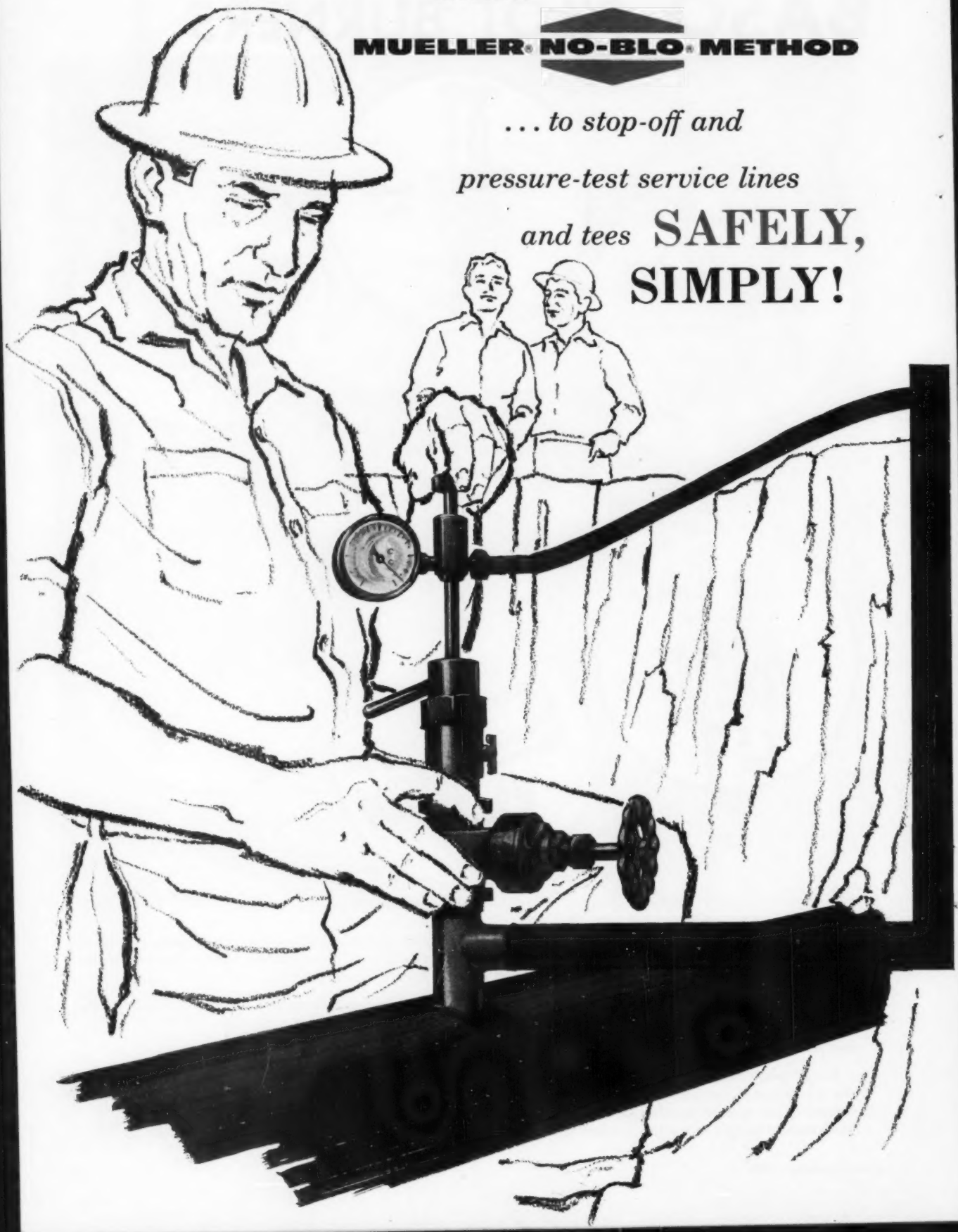
MUELLER NO-BLO METHOD

. . . to stop-off and

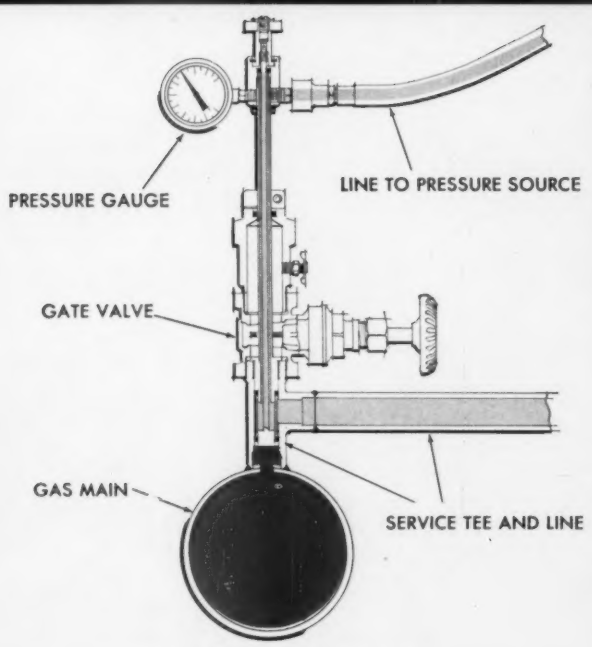
pressure-test service lines

and tees **SAFELY,**

SIMPLY!



■ Here's a new and versatile machine and procedure for pressure-testing new, repaired or relocated mains and services. Just one lightweight, compact machine will stop off a damaged service line and perform a stand up test after completion of repairs. Specifically designed for stand up testing, the machine can be used to stop-off service tees whenever welding repairs are not needed on the tee inlet or outlet. A special connection permits an outside source of pressure to be easily connected for testing the job before or after the main is drilled. Depending on pressure available and flow requirements, the machine further demonstrates its versatility by maintaining *gas service* from an outside source during main changeovers and similar operations.



MAIN PRESSURE STOPPED OFF... OUTSIDE PRESSURE SOURCE IS TESTING COMPLETED REPAIRS.

Typically-rugged Mueller quality

The steel construction and strategically-placed O-ring seals permit the unit, available in ¾" and 1" sizes, to contain working pressure up to 125 P.S.I.

MODEL H-17020 MACHINE

For use with gate valves. (H-17021 Machine, for use with H-17025 control chamber, also available.)

The Mueller No-Blo Service Tee Stopping Machine and Stand Up Tester is safe, simple and economical. Its variety of talents and ease of portability makes it a valuable new member of every field maintenance crew.

Write for complete information and specifications.

MUELLER CO.

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Factories at: Decatur, Chattanooga, Los Angeles
In Canada: Mueller, Limited, Sarnia, Ontario

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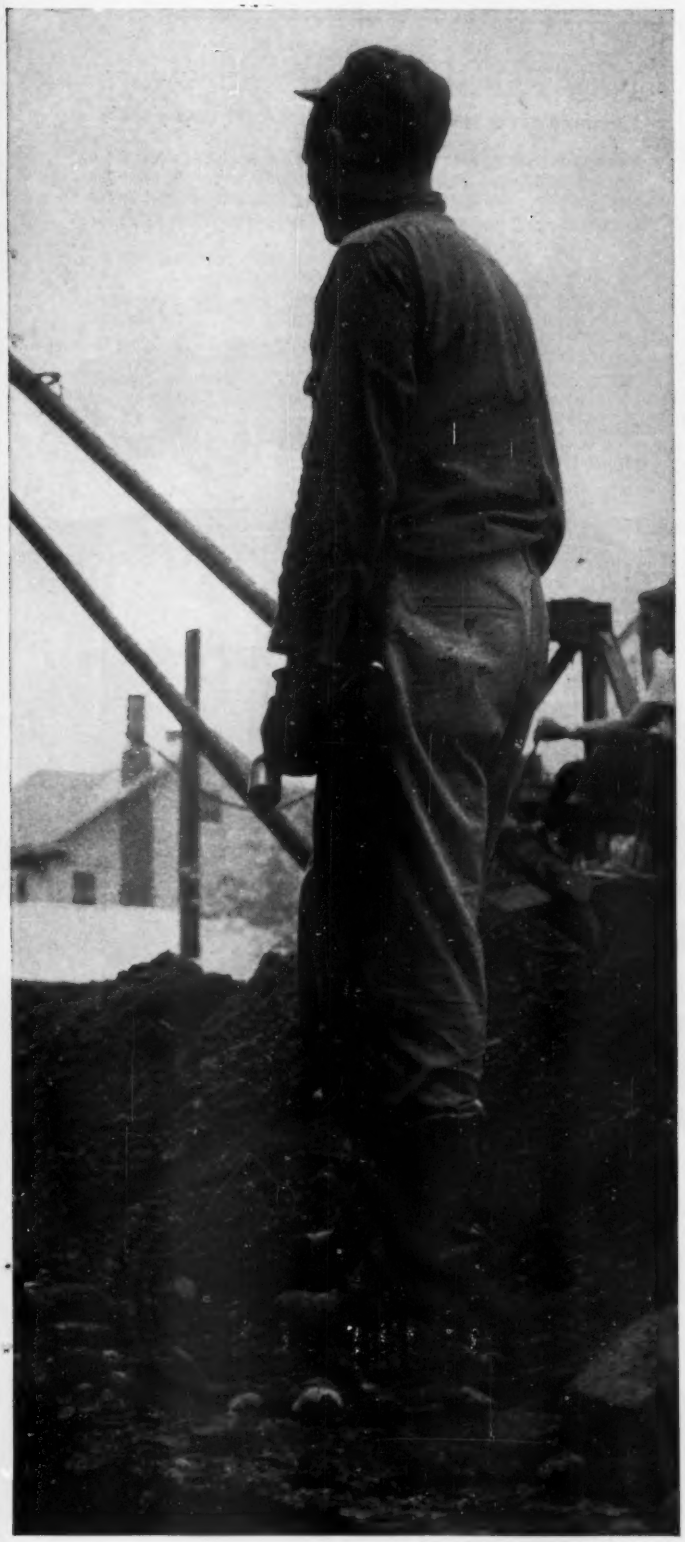


INSTALLATION IS A CINCH WHEN YOU CHOOSE CAST IRON PIPE

One of the reasons so many pipe experts prefer cast iron pipe is because it installs so easily—requires no coating or wrapping. As you see, the crew at the left is assembling the convenient lengths of cast iron pipe before trenching them—a particularly valuable time-saving operation when work crews must combat the handicap of wet trenches.

Besides being easy to handle, cast iron pipe is inherently rugged: it withstands all the usual stresses to which underground pipe is normally subjected; its modern mechanical joints remain tight under normal distribution pressures.

And tough cast iron pipe construction offers service-free dependability for years. Once in place, cast iron pipe stays there. In fact, 62 American cities are still using cast iron gas mains that were installed over a century ago.

CAST IRON PIPE RESEARCH ASSOCIATION,
Thos. F. Wolfe, Managing Director,
3440 Prudential Plaza, Chicago 1, Illinois

CAST IRON PIPE
THE MARK OF THE 100-YEAR PIPE

ECONOMY NEVER CAME IN SUCH A CHOICE

NEW '61 FORD TRUCKS

New Falcon Pickup

Economy never had such style!

Meet the pickup that's priced* as much as $231 less than leading conventional pickups! It delivered over thirty miles per gallon in certified tests! Big six-foot box with low (25.2 in.) loading height! And now—a new 170 high-performance Six plus the 144 Economy Six engine!

619 new models!

All engineered with one idea in mind... economy! New one-piece cab-body design for Styleside Pickups! New "Big Six" power for 2-tonners! New Econoline models that pack bigger loads in three feet less truck length! All at prices that give you a flying start to long-term savings. On all 1961 Ford Trucks, each part, except tires and tubes, is now warranted by your dealer against defects in material and workmanship for 12 months or 12,000 miles, whichever occurs first. The warranty does not apply, of course, to normal maintenance service or to the replacement in normal maintenance of parts such as filters, spark plugs, wiper blades and ignition points.

New 4-Wheel Drive Pickups

Ford's low-priced 4 x 4 models have the getup and traction to go most anywhere . . . road or no road! You can choose from two modern engines—the gas-saving 135-hp Six or the 160-hp V-8 that gives extra power and smoothness with "six-like" economy.

New "Big Six" Engine

More power for America's savingest 2-tonners

Now . . . in a new, big 262-cu. in. Six, Ford gives you the power of big displacement, the durability of heavy-duty construction, plus the gas economy of 6-cylinder design! Available early 1961. New 2-ton toughness, too, with a stronger, heavier frame . . . new riding comfort with new, smoother acting springs . . . and a rugged true-truck front suspension that can give up to twice the tire life of "soft" car-type suspensions!

New Styleside Pickup

Leader in looks, loadspace and low costs!

Ford's 6½- and 8-foot bodies both offer greater loadspace for '61—as much as 16% more! New one-piece cab-body design on a longer wheelbase gives greater strength, new comfort! And look at these savings:

Save up to $157 on price*! Ford Styleside Pickups are priced below all other comparable pickups! Save up to $219 on gas! Ford Sixes beat all leading competitive sixes in certified tests—scored up to 27% more mpg. That figures out to $219 in 50,000 miles! Save up to $150 on tires! In certified tests of truck suspension systems, Ford front tires lasted up to twice as long. In 50,000 miles, that can add up to $150!

FORD TRUCKS COST LESS

YOUR FORD DEALER'S "CERTIFIED ECONOMY BOOK" PROVES IT FOR SURE!

FORD DIVISION, *Ford Motor Company*

New Econoline

America's lowest-priced* pickup—bar none!

Meet a revolutionary new pickup that saves more ways than any truck you've known! Modern cab-forward design pares away over a thousand pounds of dead weight, yet you get as much payload capacity as standard ½-tonners! It's three feet shorter over-all, yet there's a big 7-ft. box with 73 cubic feet of loadspace! You get lively performance in a proven Falcon Six that delivered up to 40% better gas mileage in certified tests!

**Based on a comparison of latest available manufacturers' suggested retail delivered prices*

WITH THE BENDIX
G-15 COMPUTER YOU CAN

START NOW

THERE IS NO NEED TO DELAY that important decision to install a computer. At a low initial investment . . . without adding special personnel or facilities, you can *start now* to provide your firm with the money-saving speed and precision of proven electronic computation. ● And you can inaugurate your computer program with the foreknowledge that the G-15 can be easily expanded, easily adapted to your computational growth . . . without re-programming, without awkward modifications. You know from the beginning that your G-15 will be able to easily assimilate the full range of input-output devices—paper tape, punched cards and magnetic tape, in addition to special code conversion, printing and graphic output units . . . all proven in a wide variety of applications. Simplified, minimum-cost application expansion is made possible by an extensive library of Bendix routines and automatic programming systems. ● Thus, with equal efficiency, the G-15 has served a one-man company and corporations of many thousands. More important, that one-man company has grown to a team of 47—still economically served by an enlarged G-15 system. ● These facts point to the practical economy and ease of initiating your data processing program . . . moving from a low cost basic G-15 computer to a powerful, integrated medium-scale system, capable of spanning the full range of scientific and commercial applications. They make clear that there is a G-15 system to match your data processing requirements . . . *starting now.*

For application information write:

Bendix Computer Division
DEPT. AN-28, LOS ANGELES 45, CALIFORNIA

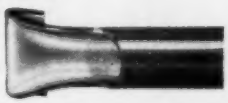
THE Bendix CORPORATION

Phelps Dodge has combined the outstanding corrosion resistance of tin with the strength and ductility of copper in a new, low-cost tube that is immune to troublesome sulphur conditions found in some natural gas and petroleum products. It has special advantages for gas utilities in main-to-meter lines, LP gas lines and as instrument tubing.

The continuous, inseparably-bonded tin lining positively resists flaking action that can plug lines and orifices. The tube can easily be bent, flared or soldered, advantages that reduce labor costs. Tin-lined tube is ideal for replacement service, can be pulled through old steel or iron pipe without protective wrapping. Available in long continuous lengths and in sizes from ⅛" O. D. to ⅝" O. D. Sample and descriptive data sent on request.

Phelps Dodge tin-lined copper tube also has advantages for: oil lines; food-processing lines; beverage, pharmaceutical and water-distilling equipment; sampling lines to laboratory and control instruments.

Fusion-bonded tin lining will not crack, peel or flake when bent or flared.



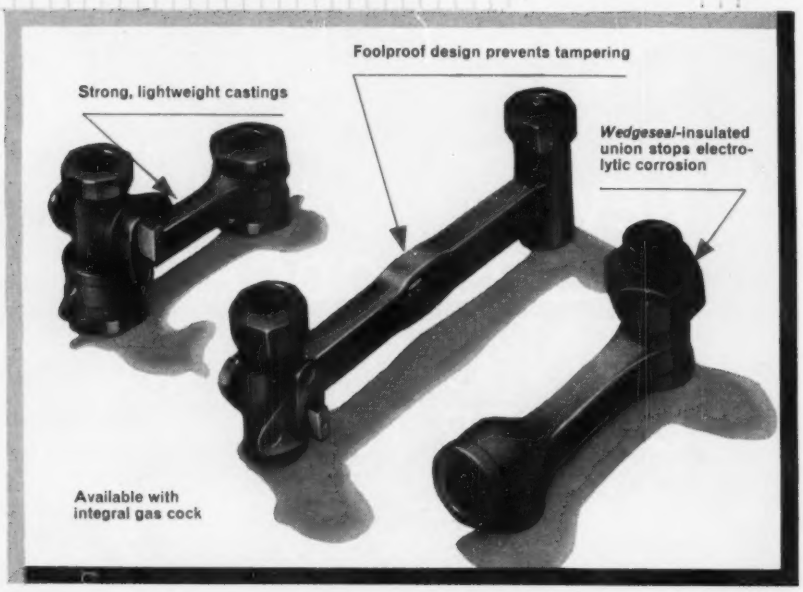
*Patent pending

PHELPS DODGE COPPER PRODUCTS
Corporation • 300 Park Avenue, New York 22, N. Y.
FIRST FOR LASTING QUALITY—FROM MINE TO MARKET!

PD

Improve your gas meter sets with Eclipse Rigid Meter Bars

201 sizes and shapes for every requirement


Foolproof design prevents tampering
Strong, lightweight castings
Wedgeseal-insulated union stops electrolytic corrosion
Available with integral gas cock

Eclipse Rigid Meter Bars improve gas meter sets by reducing the number of threaded connections and make-up time. "Plumbers' nightmares" and on-the-job improvising are eliminated. Made from sound, strong, one-piece castings, Eclipse Meter Bars are accurately machined to hold alignment of the piping, speed installation and protect the meter from strains. Periodic meter changes can be made easily without disturbing the house or service piping.

Three basic types of Eclipse Meter Bars are available in a wide range of sizes and shapes for every requirement.

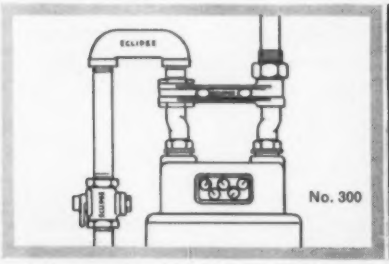
Union-type — with standard gasket union, brass-to-iron ground joint union, or with Wedgeseal-insulated union to protect mains and services from stray or induced house currents. Offered with top outlet, end outlet, or back outlet.

Sleeve-type — for "straight-through" threaded coupling connections.

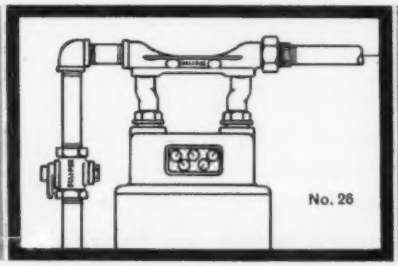
Compression-type — eliminates the need for threading connecting pipe.

All three types are available with or without integral gas cocks of standard or "Retained Key" construction.

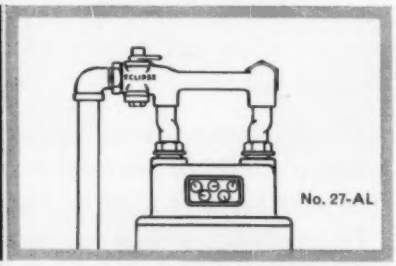
The next time you order fittings — specify Eclipse Rigid Meter Bars for better installations at a lower cost. Write for Bulletin No. 200-2.



Top union outlet takes minimum space horizontally. Tapered sleeve for easy connection to service piping. Meter cannot tilt. Perfect where entrance to house is above meter set.



End union outlet takes a minimum of space vertically. Ideal for installations where outlet piping goes back underground, or where entrance to house is at the right of the meter.



Back union outlet for neat, compact installations where outlet goes directly back into house. Ideal for setting meters inside close-fitting protective domes.

Eclipse®

GAS SERVICE PRODUCTS DIVISION

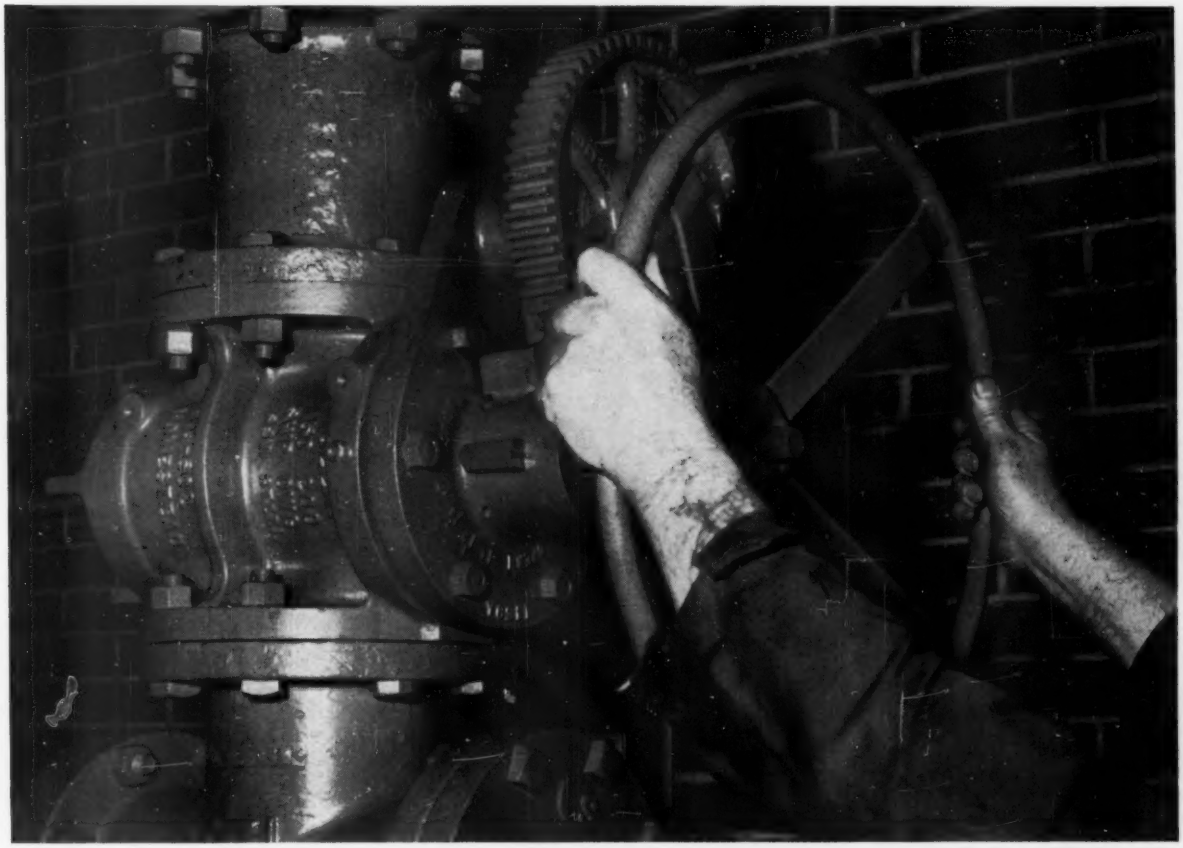
ECLIPSE FUEL ENGINEERING COMPANY

1109 Buchanan St., Rockford, Illinois

Export: Ad. Auriema, Inc., 85 Broad Street, New York 4, N.Y.

100% FLUID CONTROL AT YOUR FINGERTIPS

with Homestead Lubricated Plug Valves. When open, they provide full pipe-sized passage to fluids. Closed, their controlled high pressure lubricant



system, plus extremely close plug and body tolerance, guarantee a complete chemical seal—positive shut-off without contamination of line fluids. Instant response is sure, too, because piston-like movement of plug during each lubrication prevents sticking. They are low in first cost—low in upkeep. Write for complete details.

hv

HOMESTEAD VALVE MANUFACTURING COMPANY
P.O. Box 405, Coraopolis, Pennsylvania

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Gentlemen: Please send me Catalog 39-1 and prices on Homestead Lubricated Plug Valves

Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....

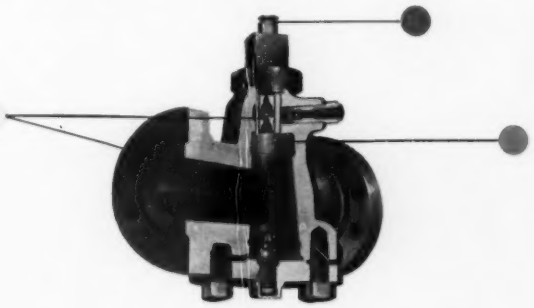
Sven Nordstrom (1881-1951) made world's first lubricated plug valve in 1914. First "lubricant" was a wickless mine candle compressed into the valve by a bolt. Most lubricated plug valves since then have been based on Nordstrom's original ideas.

he tore the wick from a candle

. . . and conceived a better valve for you

When Sven Nordstrom used a mine candle to lubricate his first lubricated plug valve, he created an entirely new valve concept . . . a valve that didn't rely for its effectiveness on wedging metal against metal.

At the time it was patented, in 1916, Nordstrom's valve was the most modern, advanced valve in the world. That is still true —for while the fundamentals have remained the same, Nordstrom's original patents have been continuously improved on through over 80 basically new patents. Over the last 44 years (and millions of valves) each innovation has helped people in a wide variety of industries solve new and even more difficult flow control problems. Look inside the modern Rockwell-Nordstrom valve, shown below, for just a few of the reasons why it will help you solve your flow control problems, too.



PERFECT APPLICATION OF A PRINCIPLE

- Lubricant quickly, easily injected through Rockwell fitting.
- Lubricant travels through Sealdport® system to create powerful seals against leakage and prevent metal-to-metal wear between plug and body . . . note seats never exposed to the line.
- Lubricant hydraulically jacks plug minutely from seat for instant quarter-turn operation.

Rockwell-Nordstrom is the original and world's most complete line of lubricated plug valves. Available in sizes from ½" to 36" and pressures to 15,000 lb. For additional information, see your supplier or write: Rockwell Manufacturing Company, Pittsburgh 8, Pennsylvania. Canadian Valve Licensee: Peacock Brothers Limited. If you live outside the USA, write: Rockwell International S.A., Geneva, Switzerland.

Lubrication Makes The Difference

ROCKWELL-Nordstrom VALVES

another fine product by

ROCKWELL

Carmen Logana, (left) foreman of meter shop, and J. Dugan, superintendent of Gas Measurement, Niagara Mohawk Power Corporation, Syracuse, N.Y.

"None of our Reeves-Vulcan synthetic diaphragms have ever needed replacement in OVER TWENTY YEARS!"

"Over 72,000 of our active meters are equipped with Reeves-Vulcan synthetic diaphragms," says Mr. Dugan. "In our new stepped-up program of meter maintenance – in which we can process 10,000 meters a month – we have ample opportunity to check the performance of these Vulcan diaphragms.

"As our meters come in for their seven-year check-up, the only diaphragms that need replacement at present are leather. None of the Vulcan synthetic diaphragms have needed replacement. This applies to those that were installed over 20 years ago.

"We have found that synthetic diaphragms sustain meter accuracy much better over long periods of time than leather diaphragms. That's why all our replacement meters are equipped with Reeves-Vulcan synthetic diaphragms. As the number of these diaphragms in use increases, we find a decrease in the number of meters that need adjustment."

How about *your* meter efficiency? You can get greater accuracy, longer service life and lower maintenance costs with Reeves-Vulcan diaphragms. There are models for practically every type of gas meter made. Both molded and crimped styles are available in any volume. Order Reeves-Vulcan synthetic diaphragms from leading meter manufacturers or directly from:

GEM

REEVES VULCAN

Reeves Brothers, Inc., Vulcan Rubber Products Division
1071 Avenue of the Americas • New York 18, New York

UNEQUALLED IN ITS CLASS

RELIANCE SERIES 1200

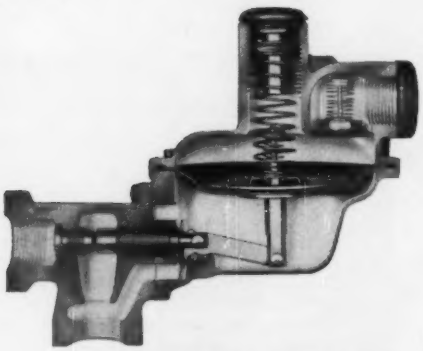
DOMESTIC SERVICE REGULATOR

Developed specifically for house service installations, the economical Series 1200 four-inch diaphragm class regulators provide many *exclusive* quality features with field-proven, dependable performance. Series 1200 Reliance regulators provide the most advanced design for those companies whose systems lend themselves to use of small regulators for compact meter settings.

Capacity of the 1200 Series is 270 cfh at 2 psi inlet, $\frac{7}{16}$-inch orifice and 1-inch w.c. pressure drop, with correspondingly higher capacities for other inlet pressures and orifices. Suitable for inlet pressures to 125 psi and outlet pressures from 5- to 15-inches w.c. Manufactured to conform to A.S.A. Code requirements.

Two models are available . . . standard Model 1203 and *full capacity internal relief* Model 1213B. Both models are also provided as Series 1300 regulators with *detachable* meter bar for 6- or 11¼-inch connection centers.

See Bulletin 105 for complete details and specifications.



CHECK THESE EXCLUSIVE FEATURES!

- RUGGED CAST IRON PIPE SECTION provides maximum strength — prevents thread galling.
- POSITIVE LOCKUP — gives over 20% greater available lockup power than any comparable regulator of its class — provides greater safety factor in event of foreign matter on valve seat.
- REMOVABLE DIAPHRAGM SECTION for ease of servicing without disturbing piping connections — valve seat disc easily replaced.
- TWO-PIECE CONSTRUCTION permits choice of four valve head positions.
- ADJUSTABLE RELIEF VALVE for accurate setting of any desired relief pressure.
- DETACHABLE METER BAR models available for both 6- and 11¼-inch connection centers.

CHECK THESE QUALITY FEATURES!

- Compact design reduces meter set assembly costs — elbow-type cast iron head simplifies piping connections.
- Relief valve stop assures relief valve operation under the most severe conditions.
- Extra-large ¾-inch weatherproof screened vent provided in four basic positions.
- Die-cast aluminum alloy body and top for ease in handling, shipping and setting.
- Brass orifice easily changed through inlet connection.
- 125 psi maximum inlet pressure. Springs available for outlet pressures from 5- to 15-inches w.c. Body sizes ¾- and 1-inch. Orifice sizes $\frac{1}{8}$-, $\frac{3}{16}$-, ¼-, and $\frac{5}{16}$-inches.

AMERICAN METER CO. ESTD. 1836

AMERICAN METER COMPANY

GEM

INCORPORATED (ESTABLISHED 1836)

General Offices: Philadelphia 16, Pa.
Sales Offices in Principal Cities

SUPPLIERS TO THE GAS INDUSTRY for Ironcase, Tinned Steelcase, Aluminumcase and Welded Steelcase Meters • American-Westcott Orifice Meters • Instruments • Reliance Regulators • Apparatus • Valves

Ten 20-ft. lengths of rigid pipe after being coupled. Two workmen did this job in only 20 minutes!

Workmen joining two sections of 1¼" rigid pipe.

ARIZONA PUBLIC SERVICE COMPANY SAVES 50% WITH

RIGID PIPE

made of ABS Plastic

RIGID PIPE GAS SYSTEM INSTALLATION OFFERS NEW PROOF OF SUPERIORITY OVER CONVENTIONAL TYPE

Big news for happy housewives in Gila Bend, Arizona—the convenience of gas utility service for the first time! Important news for utility companies everywhere—the 50% savings over cost of conventional pipe gained by use of Anesite rigid ABS pipe made of CYCOLAC throughout the system! Saved precious man-hours, too! Arizona Public Service Company completed the job in record time . . . insured a failure-free system with this lightweight, leak-proof, AGA-approved pipe. Another example of better service . . . bigger savings from rigid plastic pipe in vital municipal installations!

BE *ABSolutely* SURE . . .
INSIST ON RIGID ABS PIPE
made of
CYCOLAC
THE BORG-WARNER PLASTIC THAT IS TOUGH, HARD AND CORROSION-RESISTANT

Write for the name of your nearest supplier

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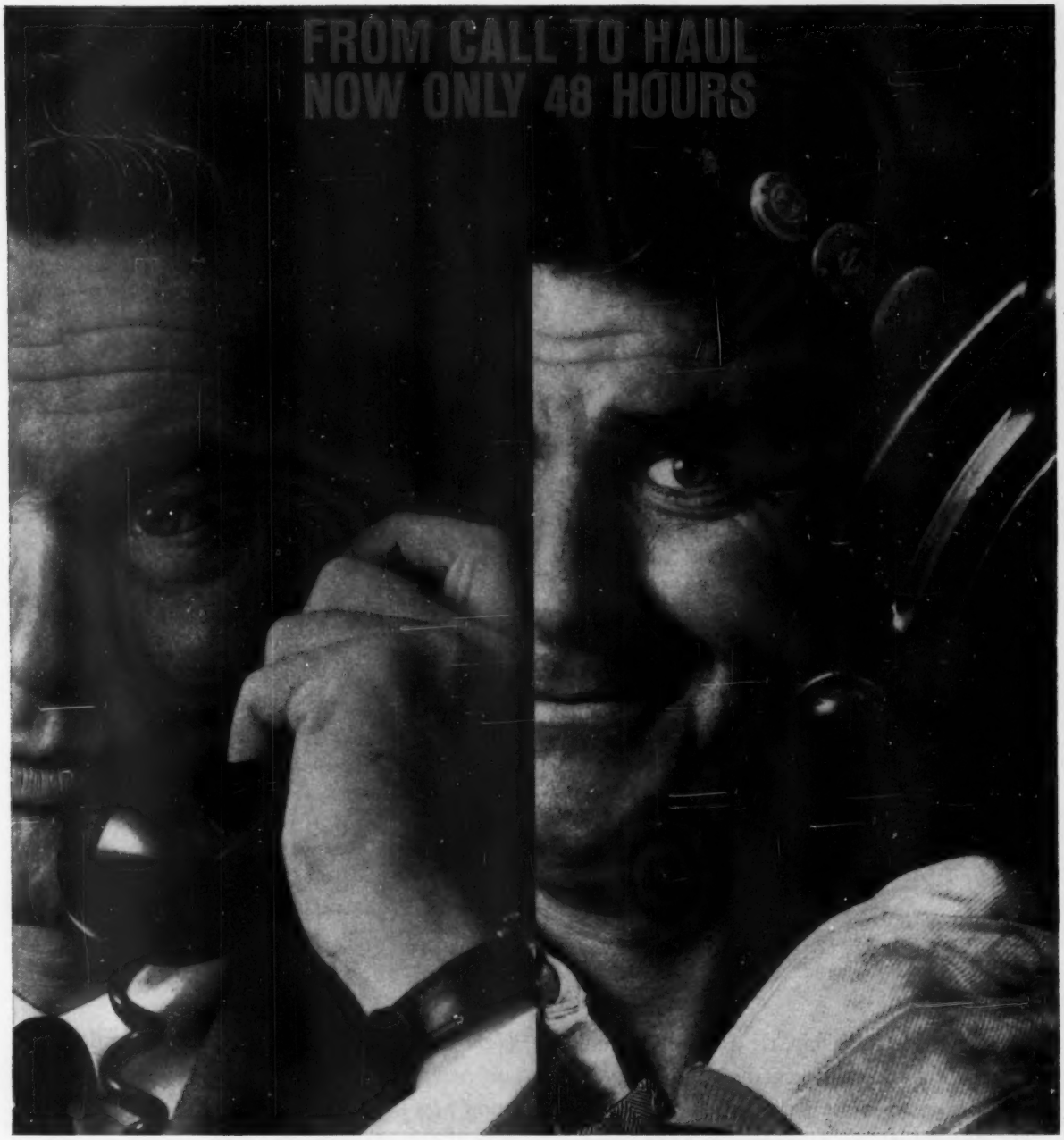

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You can depend on U. S. Pipe. Its performance is built-in.

SERVICE IS BUILT INTO CAST IRON

- Standardized mechanical joints are bottle-tight for usual gas distribution pressures . . . and for all types of gas.
- Centrifugally cast pipe is tough, strong and uniform.
- Joint design allows for deflection during and after installation.
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- Long life a matter of record.
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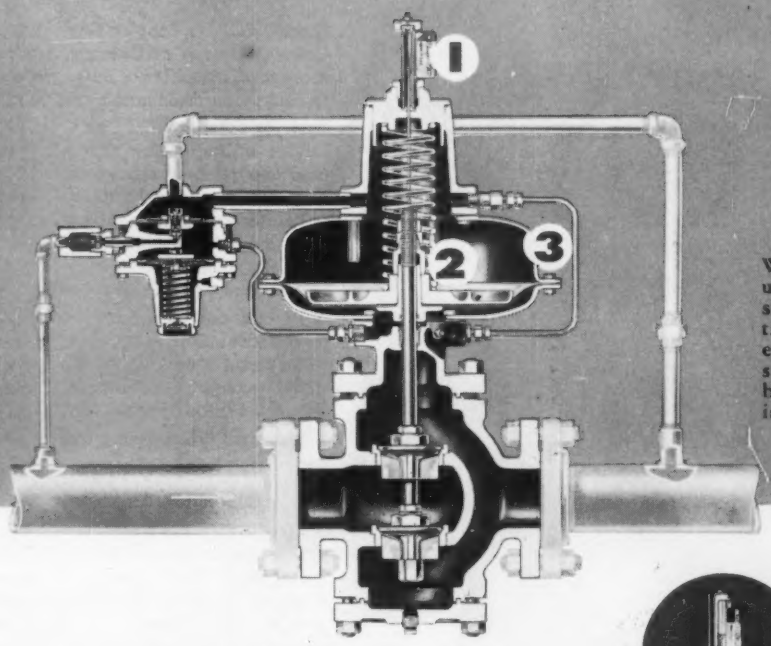


FISHER TYPE 298T

APPLICATIONS

While the Type 298T is most widely used as an intermediate or low pressure district regulator on gas distribution systems, it is equally effective in industrial applications such as heat treating furnaces, bakeries, boiler plants, and other installations.

FEATURES

1 Travel indicator shows valve position. No stuffing box—no friction causing seal! Enclosed in glass. Supplied as standard with no extra charge.

2 Specially constructed tapered locknut on rugged stem connection—no inner valve spinning under high gas flows.

3 Steel diaphragm casings of modern design for additional safety and adequate stroke for valves of all sizes.

SIZES AND PRESSURE RANGES

VALVES BODIES

- Double port "A" Body with metal to metal seats. Sizes—1" to 12"
- Double port "K" Body with "O" ring soft seat Sizes—2" to 12"

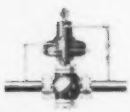
LOADING PILOTS

- Type 61H low pressure pilot Downstream pressure ranges—5" w.c. to 2 psi—2 to 10 psi—10 to 20 psi
- TYPE 61H High pressure pilot Downstream pressure ranges—10 to 65 psi
- TYPE 61HH Extra high pressure pilot Downstream pressure range—35 to 100 psi

MAXIMUM INLET PRESSURE

Valve Sizes 1 through 4"—up to 250 psi—6"—up to 200 psi—8"—up to 100 psi

If you want additional information about the FISHER Type 298T, write for Bulletin P-298C.



IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD...CHANCES ARE IT'S CONTROLLED BY...

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FISHER® Controls

SINCE 1880

In Chicago... they use the modern method of service replacement

PEOPLES GAS replaces service lines with tubing of Tenite Butyrate plastic

Since 1952, The Peoples Gas Light and Coke Company of Chicago has used more than 300 miles of Butyrate tubing to replace approximately 23,000 metal services.

This utility, which supplies gas to over one million meters, adopted Butyrate plastic tubing, in 20-foot lengths, only after extensive testing, which carefully assessed tensile strength, bursting strength, resistance to crushing and resistance to gas-borne solvents.

Throughout the country, according to a recent GAS survey, the biggest percentage of service line inserts were made with pipe of Butyrate plastic. There are good reasons for this!

Butyrate tubing provides a quick, clean, and economical method of natural gas service replacement. Holes are dug only at the main tap and service riser, with the new flexible plastic service inserted right through the old metal pipe. When used in continuous coils, the Butyrate service replacement can be a single piece of tubing without any joints. Stock fittings can be used for plastic to metal connections.

In addition, tubing of Butyrate is virtually non-corrodible and an excellent dielectric. And it costs about half as much as soft-metal tubing.

Over a decade of use has proved the many benefits of Tenite Butyrate for natural gas service. Get more facts today. We will be happy to send you additional information about the tubing, its fittings and installation, plus the names of suppliers near you. EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

TENITE
BUTYRATE
an Eastman plastic

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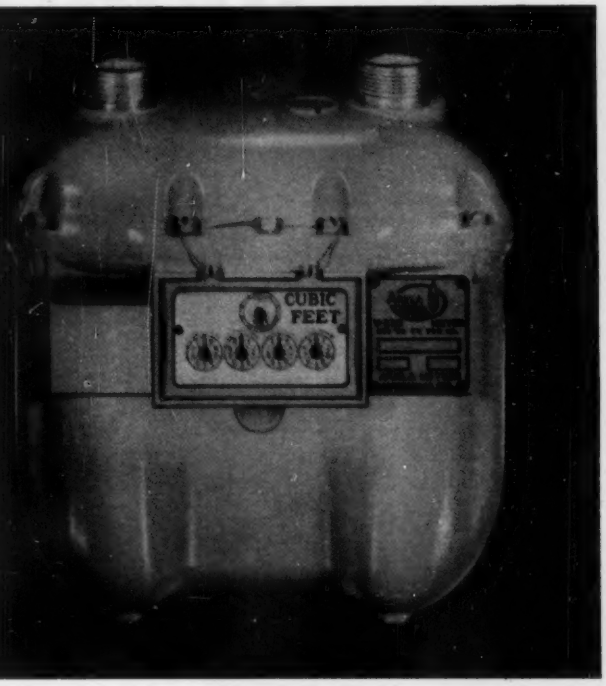

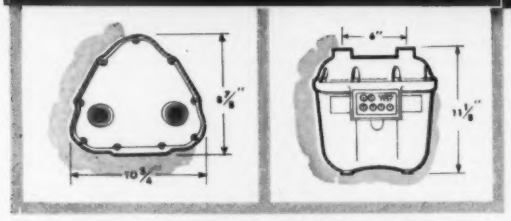

Dimensions: The Arkla V250 Gas Meter weighs less and is smaller than any other 250 cu. ft./hr. gas meter.

A NEW, COMPACT, ACCURATE "CASH REGISTER" FOR THE GAS INDUSTRY!

EXCELLENT ENGINEERING AND DESIGN of this gas meter, first of a new, modern line, are evident in its light weight and compactness that make the Arkla V250 Gas Meter easy to install... fewer moving parts reduce maintenance... accuracy of the Arkla V250 Gas Meter makes it a welcome "cash register" for the gas industry.

Order ARKLA V250 GAS METERS TODAY. *(Other models available soon.) For further information, write or call us, or ask your Arkla-Reynolds Gas Regulator representative.*

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MAXITROL

merges 2 comfort controls

now—one on the wall does it all!

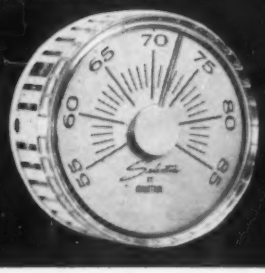
Selectra electronic modulation makes big news again: a thermostat shut-off joins the Selectrastat. In 1959 Maxitrol revolutionized comfort control components by introducing true non-cyclical heat.

Now, the Selectrastat houses the dual control function of modulation and thermostatic shut-off action. Heretofore, the Selectrastat controlled the modulator valve only; a supplementary thermostat was required to control the solenoid shut-off valve. These two functions are precisely calibrated under carefully controlled conditions and bring you added convenience, accuracy and dependability with Selectra electronic modulation. Let us send you the data.

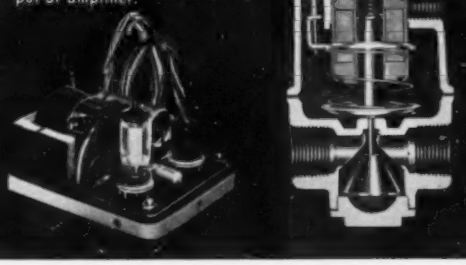
MAXITROL *Selectra*

MAXITROL COMPANY • 12200 BEECH ROAD • DETROIT 39, MICHIGAN

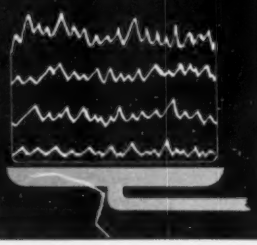
Selectrastat sets, senses living area temperature, sends signals to printed circuit electronic amplifier.



Selectra valve does double duty as a regulator and as a modulator in response to power output of amplifier.



Selectra infinitely modulates flame from full input to ⅓ input. It's not just a "full fire—low fire" system.



Season's
Greetings
CP
MFG
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Chaplin-Fulton
MANUFACTURING COMPANY
Pittsburgh 25, Pennsylvania

DIG TRENCH AND BELLHOLES IN SINGLE PASS

The Cleveland JS-30 Trencher digs bellholes at pipe joints, digs flush to obstructions, slopes as it digs.

Note the ample-width bellhole in the foreground above. The JS-30's exclusive power-shifted digging wheel shifts 2½ feet to each side of center to dig bellholes like this and to keep trench in line even when crawlers are being steered around side obstructions.

The JS-30's wheel power-*tilts*, too—saves blocking and cribbing when either crawler track is higher than the other on curbs, side slopes, etc.

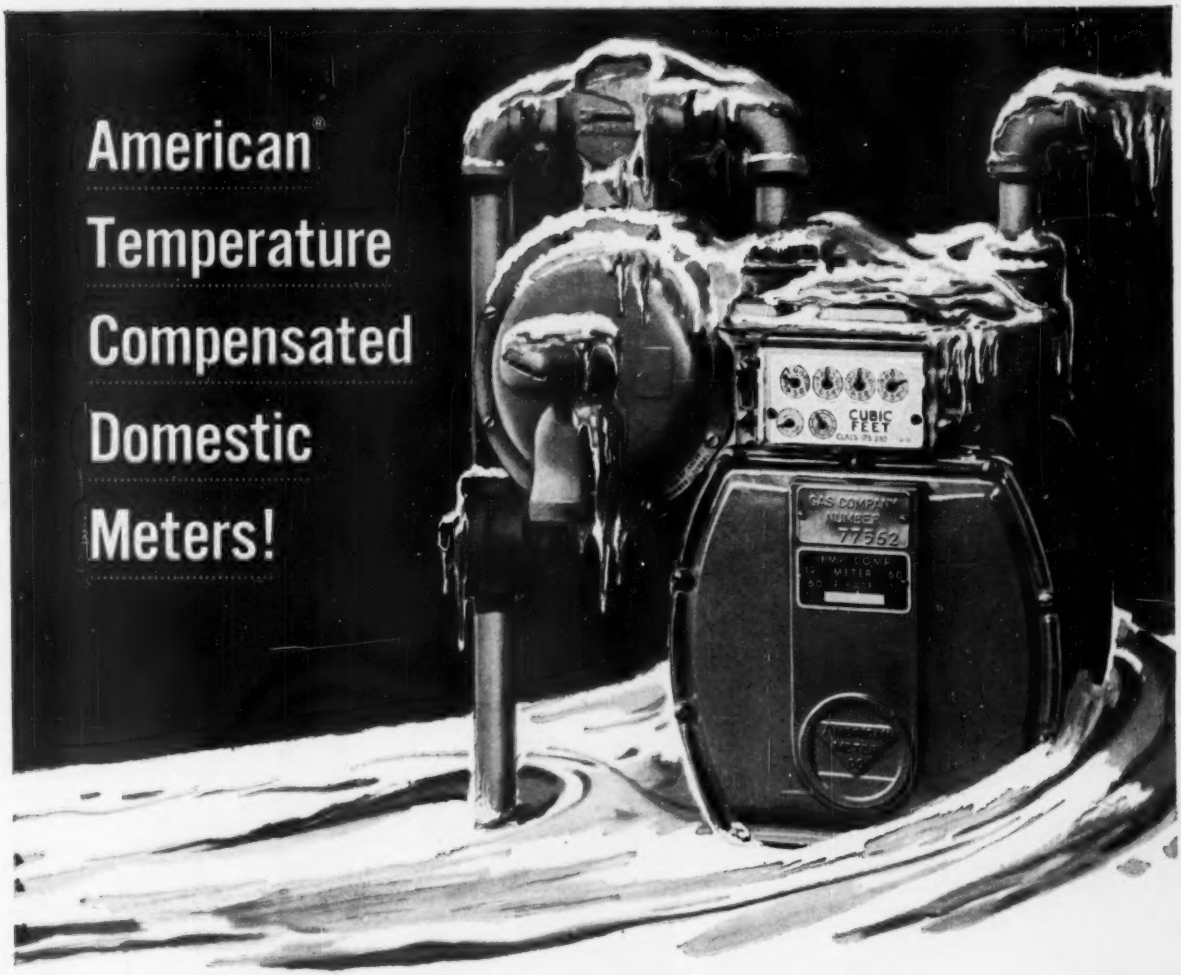
Note, too, how the JS-30's power-shifted V conveyor with operator-controlled speeds up to 1,000′ per minute—another Cleveland exclusive—easily handled the big spoil volume from the wide-sloped trench. The JS-30 sloped the trench to 6′ top width as it dug.

The JS-30 is a trencher of amazing utility —get all the facts now, from your Cleveland distributor.

CLEVELAND TRENCHER

THE CLEVELAND TRENCHER CO., 20100 ST. CLAIR AVE., CLEVELAND 17, OHIO

Now, from the pioneers in temperature compensation...



Once again, American Meter Company research has made a tremendous contribution to the technological progress of the entire Gas Industry. Like every other American Meter advance, the Temperature Compensating Domestic Meters are an outgrowth of the Company's continuous search for *better* ways to serve the industry's needs. In fact, nearly 30 years have passed since American Meter introduced the first temperature compensating device for large Positive Displacement Meters—the Base Volume Index.

The new Temperature Compensator is continuing proof that the Gas Industry can count on American to develop the most modern, accurate measurement equipment. American has pioneered in meter progress since 1836—and will continue to bring progress through research!

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NEW HANDLEY INDUSTRIES

lifetime pipeline markers and sign posts . . .

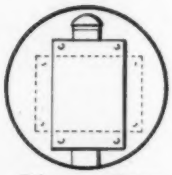
Never need painting. Won't rust or shatter!

This new, non-metallic* pipeline sign post saves money three ways. Chemically bonded color eliminates painting maintenance. The posts are light and easy to handle and store, come conveniently packaged 5 to a container. And they're sturdy, even gun shots won't shatter them.

Equally important, both pipeline markers and sign posts can be designed to meet your specific requirements. Marker posts and side-mounted sign posts may be equipped with cathodic terminal caps or vent caps. Climbers may also be added.

A 5" square foot piece is solvent-welded to the bottom of the post to prevent rotation. It anchors the post securely in the ground.

IT WILL PAY YOU TO GET THE FACTS FROM HANDLEY INDUSTRIES. WRITE TODAY.



Side-mounted sign, (vertical or horizontal). Front view shown above.

Top-mounted pipeline sign post (vertical or horizontal). *Rear view shown above.*

Marker Post with cap

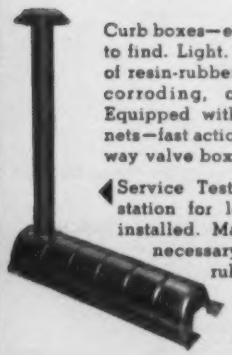
Marker Post with vent cap

Cathodic terminal cap for pipeline marker post

End call backs with attractive HI outside meter boxes. Available as shown, or for recessed installation. Made of tough resin-rubber compound*.

Master Poly-Trol *automatic* gas shut-off valve. Shuts-off gas in event of over-pressure, underpressure, excessive high temperature, and flooding. Serves also as a tamper-proof manual shut-off.

HI Cathodic Terminal Box Landscape engineered, and non-corroding*. Leads are attached to the terminal block in the cap for easy testing.



Curb boxes—extension-type. Easy to find. Light. Tough. Safe. Made of resin-rubber compound*. Non-corroding, collapsible type. Equipped with permanent magnets—fast action on finders. Roadway valve boxes also available.

Service Test Station. Provides a test station for leak surveys. Permanently installed. Makes random probing unnecessary. Made of tough resin-rubber compound*.

specifications:

Post Length: 7' (other sizes available on request)

Post Diameter: 3½"

Wall Thickness: 3/16".

**A. B. S. Polymer*

HANDLEY INDUSTRIES, INC.

904 BELDEN ROAD • JACKSON, MICHIGAN

GAS

DECEMBER 1960

Ductile cast iron pipe

in Chicago's gas distribution system

By J. L. ADKINS, Chief Technical Engineer
Peoples Gas Light & Coke Co., Chicago

CHICAGO'S gas distribution system was under construction during the years 1849 and 1850 and gas was introduced into the system for lighting on Sept. 4, 1850. Material of construction for this system and for the great bulk of extensions to the original system was cast iron. At the present time approximately 97.5 per cent of the more than 3900 miles of main now underground are cast iron.

This almost exclusive adoption of cast iron pipe for the underground distribution system by Peoples arises from the outstanding ability of the material to resist corrosion. Cast iron has proved its resistance to corrosion as many of the mains laid in 1850 to 1860 are still in service *(Table 1)*. Cast iron will withstand the normal stresses of underground service. However, abnormal stresses and strains resulting from soil heaving due to frost, the occasional cave-in, and the increasing impact of heavy traffic have caused a sufficient number of failures to warrant a search for another material. While retaining the corrosion resistance and easy laying characteristics of cast iron, this material would also possess some of the strength and ductility of steel.

Peoples Gas became interested in noduler or ductile cast iron after reading reports of its stronger and ductile characteristics. Discussions with representatives of the Pont-a-Mousson Co. of France, together with available literature on ductile iron, indicated that it was ductile and much stronger than gray cast iron and was equal and, in some cases, superior in resistance to corrosion. This gave promise to long life, an increase in safety factor in service, and less damage in shipping and handling.

Peoples discussed with American Cast Iron Pipe Co. the possibility of obtaining ductile cast iron pipe and was informed that delivery in limited quantity could be made. An order for 1000 ft of 6-in. Class 21 ductile iron pipe was placed in 1955 on a pilot basis. The pipe furnished on this order was 70-50-05, that is 70,000 psi minimum tensile strength, 50,000 psi minimum yield strength, and 5 per cent minimum elongation.

Peoples had used Class 24 as standard in gray cast iron. A 6-in. pipe of Class 24 has a wall thickness of .44-in. Statistical records indicated that the service life of 6-in. mains was in excess of 60 years. Since

ABOVE: Sixteen-inch ductile iron pipe hydrostatically tested to failure. Upon bulging and finally bursting, pipe remained completely intact without shattering, vividly illustrating ductility and toughness of pipe.

TABLE 1. Cast iron mains in service over 100 years (feet)

Year Laid	4-In.	6-In.	10-In.	20-In.
1850–1860	18,951			
1854–1860		6,154		
1852–1860			2,601	
1859				3,355

TABLE 2. Ductile cast iron pipe installed (feet)

	6-In.	8-In.	12-In.	16-In.	20-In.	24-In.	30-In.	Total
1955	1,041							1,041
1956	84,833	8,161	2,039	4,169				99,202
1957	173,284	5,048	8,859	28,418	2,127	841	638	219,215
1958	30,743	8,775	6,354	3,049	1,187			50,108
1959	128,659	7,878	5,467	18,367	3,603			163,974
TOTAL	418,560	29,862	22,719	54,003	6,917	841	638	533,540

TABLE 3. Comparative chemical analysis of 60-45-10 ductile and gray cast iron

	Averages of a Number of Tests in Per Cent				
	Silicon	Sulfur	Manganese	Phosphorous	Carbon
Gray Cast Iron	1.50	.089	.43	.62	3.54
Ductile Cast Iron	2.90	.010	.46	.07	3.30

TABLE 4. Comparison of mechanical properties of class 24 gray iron with class 21 ductile Iron

	Approximate Bursting Pressure PSIG	
Pipe Size	Class 24 Gray Iron	Class 21 Ductile Iron
6-in.	3500	4500
12-in.	2200	2850
16-in.	1900	2400

	Impact Resistance – Foot Pounds to Failure	
	Class 24 Gray Iron	Class 21 Ductile Iron
6-in.	220	2000
12-in.	600	4000
16-in.	1000	6500

	Crushing Load – Pounds per Linear Foot			
	Class 24 Gray Iron		Class 21 Ductile Iron	
	Vertical Deflection Inches	Crushing Strength	Vertical Deflection Inches	Crushing Strength
6-in.	.11″	18,100	.37″	21,200
12-in.	.29″	15,000	1.12″	17,200
16-in.	.46″	14,300	1.73″	16,800

ductile cast iron pipe is ductile and much stronger, and has similar or better corrosion resistance than gray cast iron, it was believed that some decrease in wall thickness could be allowed in order to reduce the additional cost of ductile iron pipe. Class 21 with a wall thickness of .35-in. in 6-in. pipe was selected for the pilot order. This wall thickness permitted four threads on a 1½-in. service tap and tests proved that a satisfactory tap connection could be made with pipe of .35-in. wall.

The first ductile received was installed in locations where it would be subjected to more severe service and strains due to unstable soil conditions.

Early in 1957, Peoples was informed by American Cast Iron Pipe that 60,000 psi minimum tensile, 45,000 psi minimum yield, and 10 per cent elongation fully annealed ductile iron pipe could be produced in quantity. Peoples specifications were then changed to 60-45-10 to take advantage of the increased ductility and this type was continued to be used in the medium pressure (25 psig) and low pressure (6-in. wc) system.

Over 100 miles of ductile cast iron pipe has been installed in the distribution system for the 5-year period from 1955 to 1959. *Table 2* shows the usage of ductile pipe by years. Installation of ductile dropped in 1958 from 219,000 ft to 50,000 ft due to a shortage of ductile iron supply. However, this shortage was relieved in 1959 and at present our requirements are amply met by the American Cast Iron Pipe and the James B. Clow Co.

Ductile pipe is laid in the same manner with standard mechanical joints as with gray cast iron pipe. Some difficulty was first experienced in cutting and drilling ductile as it machines more like steel than cast iron. Steel pipe cutters are used on sizes up through 12-in. and pipe saws for the larger sizes. Machine cuttings come off of ductile pipe in long continuous curls similar to steel turnings rather than small chips as with gray iron.

Ductile pipe cast in metal molds has the same smooth appearance as gray cast iron. Ductile cast in sand-lined molds has a rather hard brittle scale on the outside which is removed by shot-blasting during the manufacturing process.

All ductile pipe is given a hydrostatic pressure test of 500 psig at the mill and a 50 psig submerged air test. One of the suppliers coats the outside of the barrel with a light tar coating to prevent rust formation and present a better appearance in storage. The interior is given a coating of oil and the gasket surfaces of the socket and spigot ends are coated with a rust preventive such as No-ox-id 2W.

While ductile iron has the same appearance as gray cast iron on the "outside," it is vastly different on the "inside."

The essential chemical ingredient of ductile iron is a small but significant amount of magnesium. The actual magnesium content to produce satisfactory ductile iron is in the order of .04 per cent to .07 per cent of contained magnesium in the solidified casting.

The phosphorous content is held below .10 per cent for ductile iron where as ASA specification A21.9 allows phosphorous up to .90 per cent maximum in gray cast iron.

Sulfur reacts with magnesium and as a matter of economy, the sulfur content is held as low as possible.

The carbon, silicon and manganese contents of duc-

tile iron are controlled to suit the type and thickness of the casting as in gray iron.

A comparison of the chemical analysis of ductile and gray cast iron on a number of tests is given in *Table 3*.

The melting of the base iron for treatment to produce ductile differs from melting gray iron principally in that the iron must be low in phosphorous and sulfur. High basicity fluxes are used to hold the sulfur in the slag and out of the metal. A high percentage of steel scrap is used to produce a low phosphorous iron.

Magnesium is added to the molten metal in the ladle and as magnesium volatilizes and burns violently at molten iron temperatures, an alloy of magnesium ferro silicon containing about 9 per cent magnesium is used to reduce the violence of the reaction.

Cast iron contains about 3.5 per cent carbon. In gray cast iron this carbon or graphite precipitates in the form of randomly located flakes as the metal solidifies in the mold. These flakes form, in effect, a series of sliding or cleavage planes which limit the ductility and act as rupture lines when the metal is over stressed.

When the magnesium alloy is added to the molten metal, it produces a startling change in the iron and causes the graphite to precipitate in the form of small spheroids or nodules as the metal cools. With the graphite in spheroid form the metal does not contain the cleavage planes as with the graphite in flake form, and after proper heat treating and annealing the ductile iron is much stronger and more resilient than gray cast iron.

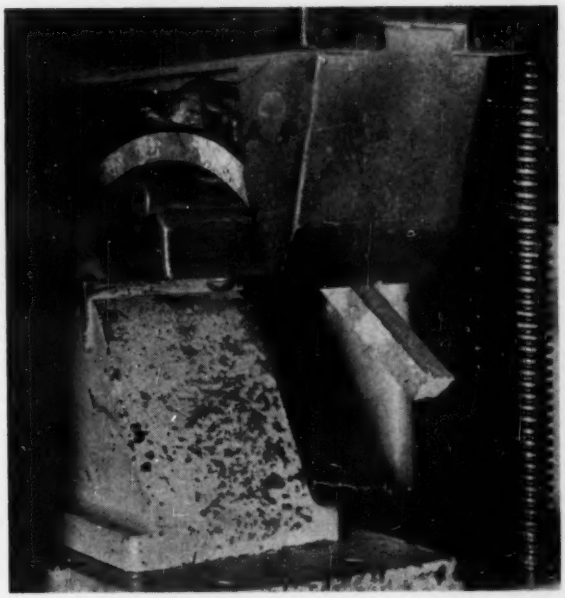
Tensile tests on machined specimens of gray cast iron are not included in ASA specification A21.9. The full length bursting tensile strength, however, is included at a minimum of 18,000 psi when tested to destruction in full length bursting tests.

Tensile properties of ductile iron are specified in ASTM A-339, these tests being conducted on a machined test specimen. The as-cast grade is 80-60-03. The annealed grade which is used in ductile pipe is 60-45-10 or 60,000 psi minimum tensile strength, 45,000 psi minimum yield strength, and 10 per cent minimum elongation.

There is no standardized test method for determining the impact strength of cast iron pipe. The method used by the American Cast Iron Pipe is to drop a knife-edge hammer on the test pipe which is filled with water under pressure of about 40 psig. Failure of the pipe is indicated by a water leak showing through the pipe. The impact energy in foot-pounds is calculated from the hammer weight and the height of the drop. Ductile iron pipe normally resists about 10 times the impact energy of gray iron pipe of the same wall thickness and size.

Beam tests on 6-in. pipe are made with the pipe supported on a 15-ft span with the loading applied at points 5 ft from each end support. A 6-in., grade 60-45-10, ductile pipe will deflect or bend approximately 15 in. under this test before failure. A 6-in. gray cast iron pipe will fail at approximately 3½ in. deflection.

The unit crushing strength for gray cast iron pipe in the ring crushing test as specified in ASA, A21.9 is 40,000 psi minimum modulus of rupture. Actual average for gray cast iron pipe is about 48,000 psi. The unit crushing strength of ductile is about double that of gray cast iron pipe.



In Talbot strip test, ½-in. wide strip taken from wall of ductile iron pipe was tested as a beam on a 10-in. span with third-point loading. It bent in excess of 2 in. and did not fail.

Table 4 gives the comparison of the mechanical properties of Class 21 ductile cast iron pipe with Class 24 gray cast iron pipe which is used as standard by Peoples Gas.

Peoples has installed over 100 miles of ductile cast iron pipe in the distribution system during the past five years. The installation of ductile is the same as with gray cast iron so that no change in installation crews or methods were necessary. Damage due to shipping or rough handling has been practically nil. Inspections are made of ductile iron installations where it is necessary to uncover this pipe in order to make taps or connections. No evidence of corrosion has been found on these inspections. Ductile pipe has been installed in all types of soils and installations encountered in the Chicago area, and there has been no failures in any of the ductile pipe installed.

In one instance an excavating contractor, thinking a 12-in. main was dead and abandoned, tried to remove it by dropping a clam shell bucket on the main to break it up. Several attempts merely dented the main and finally a tooth on the bucket punctured the main causing a small leak which was easily repaired with a sleeve. This instance vividly illustrates the impact resistance of ductile, as ordinary gray cast iron would have shattered under the impact of the heavy bucket. ■

The writer wishes to acknowledge and thank the American Cast Iron Pipe Co. for data furnished on the manufacturing process and mechanical properties.

Here come the compact trucks!

IN ancient Rome, "compactus" was already a well-worn word. And since it bore essentially the same meaning as it does today, it surely must have been applied to Roman chariots many times. Yet, listening to 20th century American automobilists, one would think that the term "compact" had just been invented. It pervades current car conversation with faddish frequency.

Compact cars have been manufactured under various names (cycle car and light car, for example) since the early days of the automotive industry; but the use of the term "compact car" did not really catch on until last year. When the automotive industry began to hear information leaks on the smaller cars the "Big Three" were preparing to build, one of the first questions was: "What will we call them?" About the only word that seemed to convey the proper picture—and not sound derogatory while doing so—was "compact." Thus, the entire industry adopted the term that had previously enjoyed heavy usage in only one place—Rambler ads.

This may well turn out to be the compact era, for already the term is beginning to appear with more than casual frequency in advertising devoted to a wide variety of products. Regardless of the terminology, we are—and have been—living in a "form follows function" era that began in Germany in the '20's with the Bauhaus school of architecture and design. The idea that a thing's appearance should be determined by its functions jumped the Atlantic in the '30's and propagated profusely during the post-war American industrial design boom. Today, the form follows the function in most products made in this country.

The one exception has been the automotive field—and that because the American auto had become so much of a prestige symbol that a family could not hold up its collective head unless its garage floor was covered with wall-to-wall car. The inevitable reaction was—and is—the compact car. Is it just a fad?

Authoritative bystander *Iron Age*, perhaps the most widely known industrial magazine in the country (and a sister publication of *GAS*), does not think so. It calls the compact trend "a unanimous reversal of the philosophy that carried the industry through the 1950's." Says the metalworking industries' weekly: "A year of testing the market by Corvair, Falcon, Valiant, and Comet has shown buyer appeal for Rambler and Lark compact cars isn't restricted to a small segment of the market. The entire industry is now committed to the trend toward smaller, lighter, and more economical cars. While the big cars remain, it's almost a rear-guard action. Over-crowded highways, high maintenance costs, and excessive depreciation dictate the end of the big car as a status symbol."

All this is good news to the gas industry, which uses cars by the thousands and must, by its very nature, be even more cost-conscious than most industries. It's just good business sense not to give a serviceman a 14-in. crescent wrench when the 8-in. size will do. And it's equally good business sense not to give that same serviceman—or an executive—a large car—when a smaller one will do.

Important as the compact car might ultimately prove to the gas industry, the compact truck might prove even more valuable—since most gas companies have more trucks than cars. Still, the compact car will deserve the lion's share of the credit—for it made the compact truck possible. The plain fact is that the big automotive companies would probably never have tooled up for smaller engines, suspension systems, etc., for the relatively small volume of a line of compact trucks. But when the tooling costs for such components are amortized by the relatively high volume of a line of compact cars, it becomes economically feasible to bring out a line of compact trucks. The biggest tooling cost is for the body, although there are numerous other costs, since many of the components may have to be modified.

Still, the automotive Big Three have concluded that they can make money making compact trucks and the gas industry should be one of the many beneficiaries. On the following pages, *GAS* presents an even dozen compact trucks, including six pick-ups, four closed bodies, and two personnel carriers. The automotive equivalents of the 8-in. crescent, they may fit very well into your new transportation equipment plans.

HERE'S HOW THE COMPACT TRUCKS COMPARE

	BODY						ENGINE		CARGO SPACE			
	Wheelbase (In.)	Length (In.)	Width (In.)	Height (In.)	Weight (lb.)	Capacity (lb.)	Horse-power	Displace-ment (Cu. In.)	Length (In.)	Width (In.)	Height (In.)	Volume (Cu. Ft.)
PICKUPS												
Chevrolet Corvair 95 Loadside/Rampside	95	179.8	70	69	2710 * 2720	1900	80	145	103.3	61.8	15.5 * 27.8	80 ** 37
Dodge Dart D-100 Sweptline	114	193.8	80	68.8	3465	1540	101 * 140	170 * 225	78	54	20	66.1
Dodge Dart D-100 Utiline	114	190.9	80	68.4	3405	1630	101 * 140	170 * 225	78	54	20	47.3
Ford Econoline Pickup	90	168.4	72.5	77.2 ** 77.6	2389 ** 2441	929 ** 1679	85	144	84.8	63.2	22.8	73
Ford Falcon Ranchero	109.5	189	70.6	55.1	2452	800	85 * 101	144 * 170	72.2	55.6	14.9	21.6
Studebaker Champ Half-Ton	112	179.6	77.5	65	2966	2034	110 * 180	170 * 259	77.8	51.5	17.1	39.7
CLOSED BODIES												
Chevrolet Corvan	95	179.8	70	68.5	2810	1800	80	145	108	60	54 * 40.3	191
Dodge P-200	104	192	81	96.5	4500	3000	101 * 140	170 * 225	96	74	73	288
Ford Econoline Van	90	168.4	75.8	78.5 ** 79.2	2446 ** 2498	929 ** 1679	85	144	84.9	65	54.3	204.4
Ford Falcon Sedan Delivery	109.5	189	70.6	55.1	2567	675	85 * 101	144 * 170	85.9	57.2	33.1	76.2
PERSONNEL CARRIERS												
Chevrolet Corvair Greenbrier	95	179.8	70	68.5	3005	1600	80	145	108	60	54 * 40.3	9 passengers plus 250 lb. cargo
Ford Econoline Station Bus	90	168.4	75.8	78.1 ** 78.8	2659 ** 2711	929 ** 1469	85	144	84.9	65	54.3	8 passengers plus 275 lb. cargo

*Larger figure is for Rampside model.
**Larger figure is for heavy duty package.

*Larger figure indicates optional larger engine.

*Two-level floor.
**Smaller figure indicates optional floor panels in place.

Chevrolet

Here's how Chevrolet did the job many thought couldn't be done — build a roomy truck out of its basic Corvair layout. Note the stepped design of the unitized platform and the independent suspension. The dotted line at the rear top of the platform indicates the large engine access hatch; the dotted line at the back, the two minor servicing hatches.

CHEVROLET is making modern American truck history with its rear-engined Corvair 95's. The 95 indicates the wheelbase, which is 13 in. shorter than the Corvair sedan. Its size, however, is no indication of its ability, for its payload is a whopping 1900 lb.

Moreover, because the driver sits above the front axle and the engine is behind the rear axle, most of the load is in the best possible place, between the axles. This means: approximately 50-50 weight distribution whether loaded or empty; constant ride and handling characteristics, and elimination of compromise spring rates or heavy duty springs. Also, the lack of a drive shaft means the cargo can be carried low, where it is easy to load and rides better. And, the platform-type of unit construction means doors can be any- and everywhere, providing maximum cargo accessibility.

Corvair trucks come in four models: a pair of pickups, the Loadside and the Rampside; and a pair of bus-like closed bodies, the Corvan, a panel, and the Greenbrier, a personnel carrier. All have a stepped floor, which is only 14 in. above the ground at the center and 26½ in. above ground at the rear.

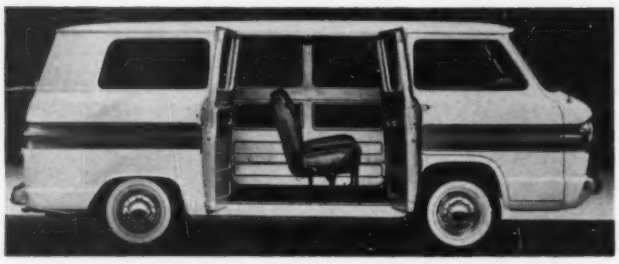
The pickups are identical except that the Rampside has a drop-down door which takes advantage of that low floor to provide a heavy-duty, 4-ft-wide cargo ramp. The stepped floor increases cargo space to 80 cu ft. For users requiring a full-length flat floor, a removable three-piece floor panel is available. This cuts capacity to 37 cu ft, but the space underneath is accessible.

The Corvan and the Greenbrier have the same basic body, but the latter has more windows. Capacities of both are impressive, 191 cu ft for the Corvan; nine passengers plus 250 lb of cargo for the Greenbrier. In addition to two rear doors, both have two right side doors and two additional left-side doors as an optional extra.

The Corvair 95 Rampside Pickup

The Corvair 95 Corvan Panel

The Corvair Greenbrier Sports Wagon



Ford

HAVING gotten the jump on its competition with the Falcon pickup, Ford continues a jump ahead with two lines of compact trucks, the Falcons and the Econolines.

The Falcon pickup, introduced last spring, continues with minor styling changes and one important engineering change, an optional larger engine that puts out 101 hp. In addition, there is now a Falcon panel, an enclosed version of the pickup and identical in most respects.

Ford's big news, however, is the 90-in. wheelbase Econoline series, a Falcon-based trio consisting of pickup, van (panel), and station bus (personnel carrier). At only 168½ in., the Econolines are not only the shortest in the field, but are a full 20½ in. shorter than the Falcon. However, their load capacity averages out to about three times that of their "bigger" brother.

"Tiny but all truck" is perhaps the best description of the Econolines. The standard load capacity of all three models is nearly one-half ton, 929 lb. An optional heavy-duty package raises this figure to 1679 lb on the pickup and van to 1469 lb on the bus.

Cargo space is also excellent aboard the Econolines. This is due in part to the fact that, while they are the shortest in the group, they are also the highest. The pickup accommodates 73 cu ft of cargo, the van, 204 cu ft. Cargo accessibility is also first rate with all tailgates and cargo doors opening more than 4 ft wide. A welcome feature on the pickup is the room in the cab, behind the seats, enough for two passengers on a short haul, or for a sizable quantity of tools or cargo.

One of the most noteworthy design features of the Econoline is the engine location—between (and slightly behind) the driver and passenger. This allows: a very short (28.9 in.) drive shaft, a completely flat floor, and engine accessibility without touching the load.

The Econoline Pickup

The Falcon Ranchero Pickup

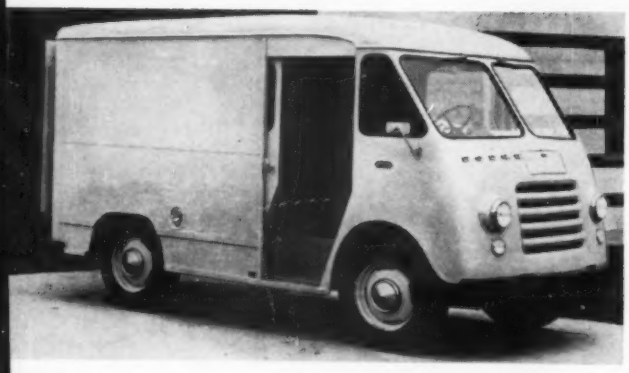
The Econoline Van

The Falcon Sedan Delivery

The Econoline Station Bus

Dodge

The 114-in. Wheelbase Half-Ton Dodge Dart Sweptline Pickup



The Dodge P-200

DODGE has been rumored to have a Valiant-based truck in the mill, but only the Valiant engine is evident in the '61 line. This year, therefore, Dodge is putting the accent on "compact economy" rather than compact size.

To go with this thinking, it's using the Dart name. The Dart is a small-sized Dodge but a full-size car, and the Dart truck is in much the same position. Dodge's smallest pickup is the 114-in. wheelbase Dart, powered either by the 101-hp Valiant engine or an enlarged version of the same slant six. It comes in two models, the Sweptline, which is nearly 194 in. long, and the 3-in. shorter Utiline.

In the same size category although it has a compact (104-in.) wheelbase, is the P-200, an enclosed-delivery-type unit with the same choice of engines.

Studebaker

The 112-in.-Wheelbase, Half-Ton Champ Pickup

INTRODUCED in February 1959, the Studebaker Champ is not only the granddaddy of the auto industry's compact trucks, but it is still among the most compact of all. At 179⅝ in., the small Champ pickup is a fraction of an engine shorter than the new Corvair and is second only to the Econoline in overall compactness.

Modifications for 1961 include a new engine and a lower silhouette. The new 110-hp overhead valve six, the only brand new engine in the compact field, has several design features aimed strictly at long life. Again, the Champ is the only compact truck offering a V-8 engine, a 259-cu in. unit that puts out 180 hp.

Everyone knows we have a Constitution. Few, however, are as intimately acquainted with its magnificent words and objectives as we all should be. It is timely that we review the intents of this precious document. Here, the general counsel for a major gas company presents our Constitution so that you, and your children at home, can savor and relish its handsome purposes that mean so much to us all.

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Our Constitutional Government

By MILFORD SPRINGER • Southern Counties Gas Co., Los Angeles

THE United States is a relatively young nation. Despite its youth, it is a nation thriving under the oldest written constitution and it is the oldest republic. The United States' Constitution is a remarkable document written in 1787 with such wisdom that it has worked throughout the changing times after some necessary amendments. There is no parallel in history to our successful intermingling of people from many foreign countries while enjoying freedom of religion and speech, equal justice under the law, social equality and economic opportunity.

Our Constitutional form of government has three branches. The legislative branch makes the laws, the executive branch carries out the laws, and the judicial branch interprets the laws.

Purposes of the Constitution: In the famous preamble to the United States Constitution we told the world that our government belongs to the people, is managed by the people, and exists for the good of all of the people. The purposes were to form a better union, establish justice, insure internal peace, provide for the common defense, promote the general welfare, and to obtain the blessings of liberty.

THE LEGISLATIVE BRANCH

ONLY the legislative branch has the power to make United States laws. The other two branches may suggest laws to Congress. No branch may interfere with the powers and duties of other branches, except in ways the Constitution permits.

The power to make the laws belongs to the American people, but the people have given Congress the right to make these laws for them. But even Congress must stay within the framework of the Constitution.

Each Senator and each member of the House *repre-*

sents the many citizens of his state.

The people receive laws which have been carefully thought out by members of Congress elected to represent them; control of members of Congress, since they vote them into office and can reject them; two "houses" of Congress each of which guards the nation against mistakes made by the other.

After long and bitter arguments in the Constitutional Convention, the large and small states worked out the "Great Compromise." They agreed that the more people any state had, the more members that state could send to the House of Representatives. They also agreed that each state should send only two members to the Senate.

This compromise satisfied both the larger and the smaller states. The state with the largest population had the most Representatives in the House. The smallest state, however, had the same number in the Senate as the largest state. And no bill can become a law unless it is passed by both the House and the Senate.

The Speaker of the House of Representatives has a very important position. He is Chairman of all meetings of the House. He is the leader of the political party having the largest number of members in the House. And if both the President and the Vice President of the United States should die, the Speaker would become President.

Only the House of Representatives has the right to accuse a public official of the United States of some important crime.

When the House has worked out its charges against the official, it places the impeachment before the Senate. The House acts as the prosecutor. The Senate is the judge.

The Senate alone is allowed to try all impeachments and to decide whether the official is innocent or guilty. If the President of the United States is to be tried, the Chief Justice of the United States presides over the Senate. The Constitution orders that the accused person shall be considered innocent unless two-thirds of the Senators present agree that he is guilty.

The Senate can punish a guilty official only by taking his position away and forbidding him ever to hold any office in the federal government.

After his trial by the Senate, the official may be tried in a court and sentenced to the usual punishments for his crimes.

The Constitution leaves most of the election regulations to the states. Congress can pass certain laws to safeguard the honesty and fairness of national elections. One law requires the secret ballot. Another law limits the amount of money that candidates for the Senate and the House of Representatives may spend during election campaigns.

The 20th Amendment requires the new Congress to meet on January 3 of each odd-numbered year following the regular November elections. This is the first session of that particular Congress. Congress meets again for a second session on January 3 of each even-numbered year. The President has power to call Congress into special session if necessary.

Sometimes persons have been elected improperly to Congress or have failed to meet the requirements ordered by the Constitution. That is why the Constitution gives each house of Congress the right to decide by a vote of the majority whether to prevent a person's becoming a member of that house.

Each house can do business whenever it has a *quorum*—when more than half of its members are present.

The Constitution directs Congress to keep a daily record. It has three official publications. The Senate has the *Senate Journal;* the House has the *House Journal.* Both are published at the end of each session. Congress as a whole has *The Congressional Record.* For many years it has been published every day that Congress has been in session. *The Congressional Record* helps Congressmen to keep account of their work and gives the people a chance to study the actions of their Congressmen. It often helps courts to find the intent of Congress when a law is to be interpreted.

The Constitution provides members of Congress with salaries, expenses, and other compensations; freedom from arrest in all cases except treason, felony and breach of peace while doing their work; and freedom from arrest for anything they say in Congress.

This fosters fearless expression of the thoughts of those in Congress. They might not risk speaking freely if they could be arrested or sued for what they say in Congress. There has been infrequent abuse of this immunity.

Our Constitution gives the House of Representatives the right to originate all bills for raising money by taxes. The voters have more control over Representatives with two-year terms than they have over Senators with six-year terms.

Most bills are passed if a majority in each house of Congress votes for them. The Constitution describes some exceptions, including bills vetoed by the President for which more than a majority vote is needed. It requires a two-thirds vote in favor of a bill in both the House and the Senate to pass it over a Presidential veto.

This system gives checks and balances between both houses of Congress and between Congress and the President; plus protection against hasty and unreasonable actions either by Congress or the President.

Our Constitution gives Congress the general power to collect taxes. Congress raises money by two kinds of taxes—direct taxes and indirect taxes. Direct taxes are those paid by an individual or corporation directly to the government, like income taxes.

The indirect taxes which Congress may collect include taxes on goods from foreign countries. These are called duties or imposts and must be uniform. Another uniform indirect tax is the excise tax. This is a tax on the manufacture and sale of many articles within the country, and on certain business transactions. An indirect tax may be passed along to another person. A manufacturer pays the government a tax on an article, but includes that tax in the price he charges the wholesaler. The wholesaler includes that tax in his price to the retailer. Finally, the consumer pays the tax as part of his purchase price of the article.

Taxes under the Constitution give us a federal government that is strong enough to perform the duties given to it by the Constitution, and that can pay the costs of carrying out these duties.

Under our constitutional form of government, the people give power to Congress to borrow money needed to carry on the work of government; and contribute taxes to pay back the money, with interest, that the government borrows.

The people in turn receive the services and protection of the government; and interest on any money they lend to the government.

Congress has complete constitutional power over trade between the United States and foreign countries. Using this authority, Congress has passed laws applying to goods entering or leaving the country, ships and other means of transportation and communication, and foreign people who may come to the United States.

Under this broad power, all our laws which apply to foreign trade are made by the federal government. This keeps the states from complicating affairs by having different laws of their own. In addition, states with seaports are kept from taxing the trade of other states.

Thus Congress has complete control over foreign commerce. This control includes the following powers: To collect tariffs, or taxes, on imported goods; to keep out harmful products; to control immigration; to keep goods needed here from being sent to other countries; and to help transportation and communication by land, sea, and air.

The people receive money collected as tariff to help in running the government; protection of American industries from unfair foreign competition; safeguards for American health and morals; protection from too many people, or from undesirable people, coming to the United States from foreign countries; conservation of natural resources; operation of lighthouses, dredging of harbors and rivers, and other aids to shipping; and uniform regulation of international trade.

The Constitution furnishes Congress authority: To regulate interstate commerce; and to supervise trade with the Indians.

The result is a free flow of goods among all the states; encouragement and supervision of transportation and communication; a check on the movement of harmful goods or persons; and protection of Indians from persons who wish to take advantage of them.

Congress has the power to decide which foreign-born persons may become citizens of the United States, and how they must comply with uniform naturalization laws.

The Constitution supplies Congress the power to pass laws which protect both an individual who owes more money than he can pay and those to whom he owes it. Such bankruptcy laws must be uniform.

The people obtain a single set of laws for the whole nation that protect them from losing all they own if they fall into serious debt; and guarantee of a fair share of the property of someone who owes them debts.

Congress has constitutional permission to turn out money, both coins and bills, and to decide how much that money is worth.

The people then use money that has the same appearance and value throughout the country.

Congress has authority to punish people who make or use counterfeit money or false government bonds.

The legislative branch makes the laws

This is a government service that protects the value of our money and bonds.

Another example of the scope of the Constitution is that Congress has power to set up a single standard of weights and measures. We now have the advantage of uniform weights and measures.

It is not well known that the Constitution granted Congress authority to set up a postal system; to help in developing the land, water, and air routes over which the mail is transported. This produces uniform postage rates; national distribution of mail at low cost; and better systems of transportation and communication.

The authors of the Constitution had vision in giving Congress the power to pass laws that allow inventors, authors, and artists, for a limited number of years, to keep anyone else from making or selling their work without their permission. This has stimulated an unusual quantity and quality of creative work.

It assures people a chance to use and enjoy the many things created by American inventors, authors, and artists; and the right to enjoy the money and fame that may come from anything one invents or creates.

When a nation goes to war, its people are in danger. That is why the Constitution orders that only Congress—elected by the people—has the right to declare war. But a war may be started by a foreign country, as when Japan attacked Pearl Harbor in 1941. The President, as commander in chief of the armed forces, may decide to use these forces to protect the United States from foreign attack. Congress then meets to declare "that a state of war exists."

Congress can raise military forces. Congress can draft citizens into the armed forces and make them obey military law. It can buy all the articles necessary for the armed forces. The makers of the Con-

stitution wanted to be sure that Congress would never lose control of the armed forces. That was why they ordered that Congress should never grant the army more money at one time than it would need for two years.

Article 1 empowers Congress "To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the government of the United States, or in any department or officer thereof."

It is called the "elastic clause" because it lets Congress stretch its powers to take care of the changing needs of the nation. This clause makes clear that Congress can use various means to carry out the powers given to it by the Constitution. For example, Congress has power to control foreign and interstate commerce. And, because of this clause, Congress also has the power to improve rivers and harbors to aid such commerce. The Supreme Court decides whether any action Congress considers "necessary and proper" is constitutional. The foresight of the fathers of our Constitution is plain here.

The Constitution directs that the people of the United States shall be protected by the right of *habeas corpus*. A person who has been arrested can force the jailer to take him to a judge. If it can be proved to the judge that there is good reason for holding the accused, he must be charged with a crime. If not, he must be set free.

Congress is denied any right to punish a person without a regular trial in court; or to declare any act a crime that was not a criminal law violation at the time the act was committed.

A clause keeps Congress from penalizing any state by taxing the goods sent out of that state. It also encourages our manufacturers and farmers to trade with other countries.

Under the Constitution the states gave up their powers to control trade with other states or countries. But a provision was written to keep Congress from misusing the powers that the states surrendered. Congress must not pass laws to help the trade of one state or hurt the trade of another state, but must treat all states equally. Ships must be allowed to go freely from state to state.

Article 1 contains a provision that "No money shall be drawn from the Treasury, but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time."

This assures that public money is spent only for a lawful purpose; and an opportunity to see how public money is being spent.

An important provision in the Constitution forbids states to make treaties, coin money, or use other powers which the Constitution gives to the federal government; or to punish a person without a trial in court.

Agreements, or compacts, between states, made with the permission of Congress, are authorized. There is an oil compact by several states that has worked well. New York and New Jersey agreed to set up the Port of New York Authority. This authority built the George Washington Bridge over the Hudson River and dug tunnels under it. Such agreements are useful.

THE EXECUTIVE BRANCH

ARTICLE 2 of the Constitution creates the second great branch of our government. It is the executive branch, that carries out, or executes, the laws passed by Congress. The Constitution gives this power and responsibility to the President. Thousands of people help him, but his job is still one of the most difficult and most important in the world. The Constitution also provides for a Vice President. He can step into the President's job at a moment's notice if the President should die or become disabled.

The makers of the Constitution thought that the President and the Vice President could best be chosen by a small group of men specially selected for this purpose. These electors make up what is called the "Electoral College," but they never meet as a single group. Instead they meet at their state capitols. Here they cast their votes and then report the results to the president of the Senate.

Early in the 1800's, our present system of political parties began. This system brought an important change in the presidential elections. The change was never put into the Constitution, but is a result of custom.

After 1830, political leaders from all parts of the country began meeting every four years in national party conventions. At its convention each party chose men to be its candidates for President and Vice President. It also decided on the party's *platform*.

On the ballot, you actually vote for the electors belonging to your party; you do not vote for the candidates themselves. But this makes no real difference, because an elector never breaks his promise to vote for his party's candidates.

The President must be a natural-born citizen of the United States; not less than 35 years of age; and a resident of the United States for at least 14 years.

In 1947, Congress changed the Law of Presidential Succession to read that the Vice President should be followed by the Speaker of the House of Representatives and then by the temporary president of the Senate. Both of these are elected officers of the government. If all four elected officers should die, then the Cabinet officers would be in line for the presidency.

Article 2 contains the Presidential requirement that "Before he enter on the execution of his office he shall take the following oath or affirmation: 'I do solemnly swear that I will faithfully execute the office of President of the United States, and will to the best of my ability, preserve, protect, and defend the Constitution of the United State.'"

By custom the oath is given by the Chief Justice of the United States Supreme Court.

When the framers of the Constitution made the President commander in chief of the armed forces, they were thinking of several important points. They ordered that the chief of the armed forces should be elected by the people. They prevented any military officer of the armed forces from seizing the government and making himself President. They also prevented

any President from becoming a dictator, because he can be head of the armed forces only as long as he is President—and a President can be impeached or voted out of office. They placed in the hands of one man the great governmental and military powers that must be used together in time of war.

The Constitution prescribes control of the armed forces by a civilian instead of a military person; executive departments run by persons appointed by the President; and a "last chance" for a pardon for anyone convicted of a crime against the national government.

A treaty is an agreement between countries. Usually our State Department works out the agreement. After the President has approved the treaty, the Constitution requires that he must send it to the Senate. At least two-thirds of the Senators must agree to the treaty before it becomes law. This rule, that the Senate must approve of any treaty, keeps the President from making important agreements with other nations against the wishes of the elected representatives of the people.

Among the very important officials whom the President can appoint only with the approval of the Senate are high officers of the armed forces, leading postmasters, head customs officials, and members of key agencies such as the Federal Power Commission, Atomic Energy Commission, the Federal Reserve Board, and the Interstate Commerce Commission.

If one of these important jobs becomes vacant while Congress is not meeting, the President may choose a person without waiting for the Senate's permission. Such an appointment is known as an "interim" appointment. When Congress meets again, the Senate votes either for or against the person chosen by the President.

Only a few of the thousands who work for the government ever talk with the President, the Cabinet officers, federal judges, or Senators. Most government workers obtain their positions through the Civil Service Commission. The commission tries to find the right people for the jobs. The commission gives examinations to people all over the country, for all kinds of jobs—from stenographers and laboratory technicians to forest rangers. When there are job openings, they are offered to the people who made the highest scores in the civil service examinations. Thus, the government tries to find the best person for the majority of jobs regardless of his political party.

Government employees have not always been selected so carefully. In earlier times, the people who had helped to elect the President were paid for their help by being given government jobs. To make jobs for these people large numbers of government employees had to be fired. It was asserted that "To the victors belong the spoils"—that is, the rewards of victory belong to the people in the winning political party. The Spoils System did not bring the best workers into the government.

Our Constitution gives the President the duty of advising Congress about the nation's affairs; the right to call special sessions of Congress; the right to receive the important officials sent to this country by foreign governments; the responsibility for making sure that the nation's laws are enforced; and the duty of studying and signing all documents appointing officials to office.

The executive branch carries out the laws

The Constitution names the wrong acts for which the President and other government officials may be impeached. If these officials are found guilty, they must be removed from office.

It is treason for a citizen of the United States to make war against this country or to help the country's enemies. It is bribery to offer or accept money in return for special favors from the government. The "other high crimes and misdemeanors" are acts that have been forbidden by laws.

The President of the United States has the most important, powerful, and exacting job in the world.

THE JUDICIAL BRANCH

THE Judicial Branch of our government interprets the laws.

Article 3 provides that "The judicial power of the United States shall be vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges, both of the Supreme and inferior courts, shall hold their offices during good behavior, and shall, at stated times, receive for their services a compensation, which shall not be diminished during their continuance in office."

The judicial branch, and especially the Supreme Court, has the power to decide whether a federal, state, or local law is permitted or forbidden by the Constitution. The Supreme Court protects the people from the other branches of our government by keeping

them from abusing their authority.

Consequently, the people get the same treatment under federal law in all states; protection against unconstitutional laws; experienced federal judges in a judicial branch independent of Congress, the President, the voters, or any political party.

Cases tried by federal courts fall into two classes—(1) cases arising from any question involved under: The Constitution, federal laws, treaties, laws governing ships; (2) cases arising from the parties involved: Ambassadors, public ministers, consuls, the United States government itself, two or more state governments, citizens of different states, and a state or its citizens versus foreign countries or citizens of foreign countries.

Certain cases, such as those concerning states or official representatives of foreign nations, are not decided in the lower federal courts. They go at once to the Supreme Court. This is called the "original jurisdiction" of the Supreme Court.

To Americans, Article 3 of the Constitution provides for a vital protection to every citizen. It commands that the trial of all crimes, except in cases of impeachment, shall be by jury. The trial must also be in the state where it is claimed to have been committed.

The people gain protection from courts and judges who might imprison or fine them unjustly. The jury decides the facts, and the judge applies the law. All the jurors must agree that a person is guilty before he can be punished.

Article 3 is specific about the crime of treason. It states that "Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort. No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court."

To prevent the United States government from treating its own citizens unjustly like English kings did, the Constitution defines "treason" and how a person may be convicted of it.

The punishment ordered by Congress for treason is death, or not less than five years in prison and a $10,000 fine.

English rulers had punished the children of traitors by taking away their rights and their property. The Constitution protects the innocent relatives of a convicted traitor from unjust treatment.

THE STATES AND THE FEDERAL GOVERNMENT

THE "full faith and credit" clause of the Constitution directs each state to honor the public acts, records and judicial proceedings of every state.

Each state must punish the persons who break its laws. Criminals cannot avoid punishment by running away to another state. The Constitution orders that criminals must be sent back to the states where their crimes were committed. This is called "extradition."

Article 4 directs that "The United States shall guarantee to every state in this Union a republican form of government, and shall protect each of them against invasion; and, on application of the Legislature, or of the executive (when the Legislature cannot be convened), against domestic violence."

AMENDMENTS TO THE CONSTITUTION

THE wise men who wrote the Constitution were not entirely satisfied with it, and were not sure that they had thought of everything. They realized that, as the nation grew, future citizens would have problems different from their own. For these reasons, they wrote Article 5, by which changes in the Constitution can be made when necessary.

All 22 amendments have been proposed in Congress by a two-thirds vote in the Senate and House of Representatives. When Congress, not the Legislatures, proposes an amendment, much time, trouble, and expense are saved.

All amendments except the 21st Amendment were ratified by state Legislatures of the necessary three-fourths of the states. If all the states were to hold special conventions to ratify an amendment, the voters would have a better chance to show their wishes than they do when the Legislatures ratify that amendment. But such conventions would be more costly than the method which has been commonly used.

The Constitution can be changed only when a great majority of the people demand it.

The 1st amendment has four safeguards for the American people: Congress must not set up any religion for the nation. It must not keep you from practicing whatever religion you prefer. Congress cannot stop you from saying, writing, or printing anything that is proper. Congress cannot keep you from meeting peaceably with other people to talk about almost anything. Congress cannot keep you from asking your government to correct something that you think is wrong.

Fearing a large national army, our forefathers wanted the right to have state militia, or citizen armies. (The National Guard in each state is made up of volunteers who are citizens.) This was the reason for Amendment 2. It keeps the federal government from passing rules forbidding the state militia to use arms in lawful ways.

Before the Revolution, the British government often made the American colonists take soldiers into their homes and give them food and a place to sleep. The people bitterly resented this, and made certain that their new government should never have this right, even in time of war, except according to law. The third Amendment to the Constitution protects homeowners against this ordeal.

The 4th Amendment denies any federal officer the

right to arrest you or to search your home or other property unless he has a warrant. This is a protection of your liberty and your privacy except when it seems probable that you have broken the law.

By the highly publicized 5th Amendment to the Constitution, the federal government cannot bring you to trial for a serious crime until a grand jury has decided that a crime has been committed, and that you probably committed it.

This amendment also names certain other things that the federal government cannot do: If you have been tried and found not guilty, the government cannot try you again for the same crime. When you are being tried for a crime, the government cannot force you to say anything to injure yourself. The government cannot execute or imprison you, or take away your property, except by fair methods under the law. If the government needs your property for a good reason, it must pay you a fair price for it.

The 6th Amendment describes rights to a fair trial which the federal government must give you if you are arrested on a criminal charge. You must have: A public trial as soon as possible after being arrested; a jury of fair-minded citizens who live near the place where you are supposed to have committed the crime; information telling you just what you are supposed to have done, so that you can prepare your defense; a chance to see, hear, and answer the witnesses who speak against you; the help of the government, if necessary, in bringing to court witnesses who can help you; a lawyer to defend you, paid for by the government if you are unable to pay him.

Through Amendment 7 the people give instructions that call for a jury trial in all civil cases except minor ones; and that tell the courts exactly how far they may go in questioning the work of the jury, and that is confined to a mistake in the applied law or lack of substantial proof. The people gain protection against unfair decisions in civil cases; respect for the decision of the jury; the possibility of a just decision if the jury fails in its duty.

The 8th Amendment rules that federal judges must not ask for unfair amounts of bail. It also exacts that people convicted of crime shall not be tortured, and shall not be fined or imprisoned more than is fair. No "cruel and unusual punishments" may be inflicted.

The first eight amendments listed rights belonging to the people. Those rights were so clearly described that the federal government could make no mistake about them. It was not possible, however, to list all the rights which the people wanted to keep for themselves. Amendment 9 was added to prevent the federal government's trying to take away people's rights because those rights were not named in the Constitution.

Amendment 10 is extremely important and specifies that "The powers not delegated to the United States by the Constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people."

"Powers not delegated . . . are reserved . . . to the people." Those words are of great importance. They were put into the Constitution because many leading Americans believed that *all* political power has always belonged to the people. As John Adams said, "You

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The judicial branch interprets the laws

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have rights antecedent to all earthly governments; rights that cannot be repealed or restrained by human laws; rights derived from the Great Legislator of the Universe."

When the Supreme Court ruled under Article 3 that a citizen of one state or of a foreign country could sue another state in a federal court, the states asked for Amendment 11. It gives an explanation of the power of the federal courts to judge certain kinds of cases.

The 12th Amendment makes members of the Electoral College vote for a President and a Vice President on separate ballots.

Amendment 13 gives an order ending slavery; power to Congress to make everyone obey the order. It is protection against forced labor or imprisonment for all persons except criminals.

The main purpose of Section I, Amendment 14, was to make citizens of the former slaves and to keep the states from taking away their rights of citizenship.

This section says that persons who were born or naturalized in the United States are citizens, both of the United States and of the state they live in.

Most important are the words: "nor shall any state deprive any person of life, liberty, or property without due process of law." These words mean: The states must use fair, legal methods when they try to take away a person's life, liberty, or property. The states must not take away certain kinds of rights and privileges no matter how legally it is done. The words are used, for example, to protect freedom of speech, press, and assembly from interference by the states.

The last words of this section require states to give equal protection of the laws and mean that whatever rights are given or rules are made, they must be the same for everyone.

The Constitution can be amended only when a great majority of the people demand it

Before the War Between the States, many leaders of the Confederacy had been officials of the United States government or had held offices in state governments. When those leaders took office they swore oaths to support the Constitution. After the war, Congress decided that these men had broken their oaths when they joined or helped the Confederate forces. Amendment 14 punished these men by keeping them from holding public office again.

The 14th Amendment contains a clear description of United States citizenship and state citizenship; and gives instructions that keep the states from taking away certain important rights.

The 15th Amendment ordered both the federal and the state governments not to keep any citizens from voting because of race or color, or because they had once been slaves. Yet it did not give all citizens the right to vote. Many states did not give women the right to vote until 1920, when Amendment 19 was added to the Constitution.

The federal government needed the money by 1913 from the income tax to pay its growing expenses. For that reason, Amendment 16 was added to the Constitution. This amendment makes it constitutional for Congress to tax all kinds of incomes. The federal government now gets more of its money by taxing incomes than in any other way.

Before 1913, United States Senators were not elected by the voters; they were chosen by their state Legislatures. This method gave the voters little control over the Senate. For instance, some members of the Legislature were suspected of taking bribes to choose certain men as Senators. It was finally decided that the voters should elect Senators just as they elect Representatives. Amendment 17 makes this the law of the nation.

The 18th Amendment prohibited the manufacture, sale and transportation of intoxicating liquors. It was repealed by the 21st Amendment of 1933, thereby demonstrating that the people can experiment and then change the Constitution to follow the will of the majority.

In the early years of our country, women had little chance to take part in government, and were not allowed to vote. During the 1800's, however, more and more women began demanding the right to vote. By the early 1900's, a number of Western states were already allowing women to vote. Finally, in 1920, Amendment 19 gave women in all parts of the United States the right to vote in state and national elections. Today we have more women voters (56 million) than men who are eligible to vote (53 million).

Amendment 20 is called "The Lame Duck Amendment." It orders the newly elected Congressmen to begin work on January 3, about a month and a half after election, and the new President to take office on January 20.

It gives instructions that allow those you have elected to Congress to start carrying out your wishes soon after election; and that prevent defeated members of Congress from staying in office longer than about a month and a half.

In 1940, when the United States was in danger of being drawn into World War II, Franklin D. Roosevelt was elected President for the third time. In 1944 he was elected again. Never before had a President been elected more than twice. If it had not been for the war, Roosevelt probably would not have been President for more than two terms. Many Americans have long believed that two terms are sufficient for a President.

Amendment 22 keeps any President from being elected more than twice. It also keeps a Vice President or anyone else from being elected to the Presidency more than once if he has already served more than two years to finish the term of another President.

SUPREME LAW OF THE LAND

THE Constitution speaks of only two kinds of government—federal and state—to which the people have given certain powers. State governments, however, have given up part of their powers to local governments—in counties and cities. Thus, we have three levels of government.

When the powers of government are split up in this way, local laws sometimes disagree with state laws, and state laws with federal laws. Then there has to be some way of deciding which group of laws should be obeyed.

The people in Article 6 of the Constitution require that the Constitution, treaties, and laws of the United States shall be supreme—that is, shall be above state and local laws.

We Americans should count our blessings for our constitutional form of government by which we live and prosper under the rule of law. Contrast our existence with that of people who live under the rule of force and fear in communist countries. ■

ROCHESTER GAS DEVELOPS A PORTABLE, LIGHTWEIGHT, BATTERY-OPERATED ODOROMETER

By ROBERT W. GILKINSON
Rochester (N.Y.) Gas & Electric Corp.

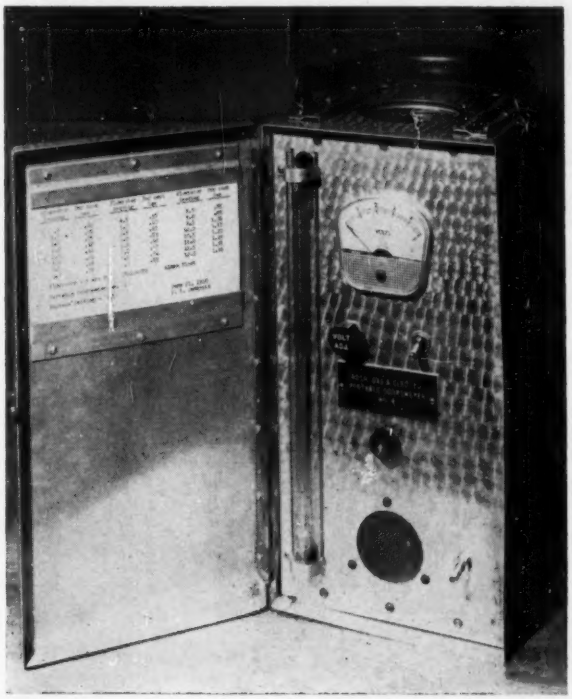


Fig. 1. Front view of Rochester's battery-operated portable odorometer.

RECENTLY it became apparent that a portable, light weight, battery operated odorometer would be desirable for general field use in making gas odor level measurements in our expanding gas system. Accordingly, a new odorometer (No. 4) was designed and constructed in our chemical laboratory. It incorporated the above three features, as well as some of the component parts from the three previous models which have been built and used very successfully on a daily basis over the past several years.

Prior to 1952, two models of a non-portable nature were built in our laboratory and used successfully for a period of time. However, early in 1952 it became obvious that some sort of a portable odorometer was needed for making odor level tests in our outlying areas. At that time, a unit was built (Model No. 3) which was patterned somewhat along the lines of an early instrument made by Oronite Chemical Co. Credit is given here for the fact that some of these ideas were able to be incorporated into our unit. This instrument, of which we have a total of three, is a 110-v ac-operated unit and has proven to be a very essential piece of equipment.

However, in field survey studies a source of electric current is not always readily available. Therefore, it was felt essential to supplement the portable electric-operated odorometer with a battery-operated unit. Various changes in design and construction were necessary in the development of this new model instrument. We now have seven battery-operated odorometers in daily use. This brings our total to 10 units for use in odor evaluation work.

• Description of the instrument

The general overall size and dimensions of the face plate and carrying case of this new instrument are quite similar to the original units, measuring approximately 7 in. x 7 in. x 14 in. *Fig. 1* shows the front view of this assembled instrument with the door opened. The outside case and face plate were fabricated from 1/16-in. aluminum sheet. The base plate—on which is mounted the working parts of the odorometer—and the top were made out of ⅛-in. aluminum sheet. Air for dilution is supplied by a No. 2 Ripley Blower with 3/16-in. shaft. The blower is driven by a Tiny Atom Motor and/or Uniperm 3-v electric motor, which is run by three Burgess-type B2BP, 3-v "A" batteries.

The blower and motor shafts are coupled together with a metal sleeve fitted with set screws. The speed of the motor is controlled with a Clarostat variable rheostat which is connected to the voltage adjustment knob. A Weston Model 1721 voltmeter (range

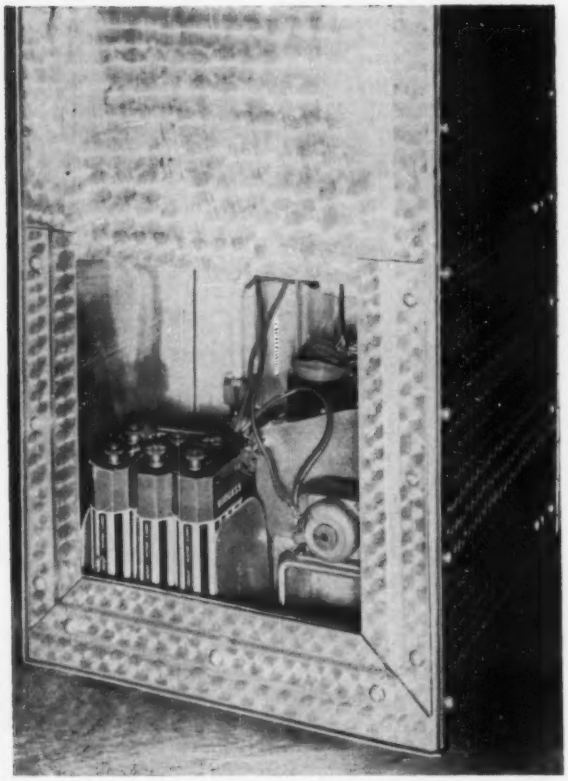


Fig. 2. Back lower half of instrument with sliding panel in up position.

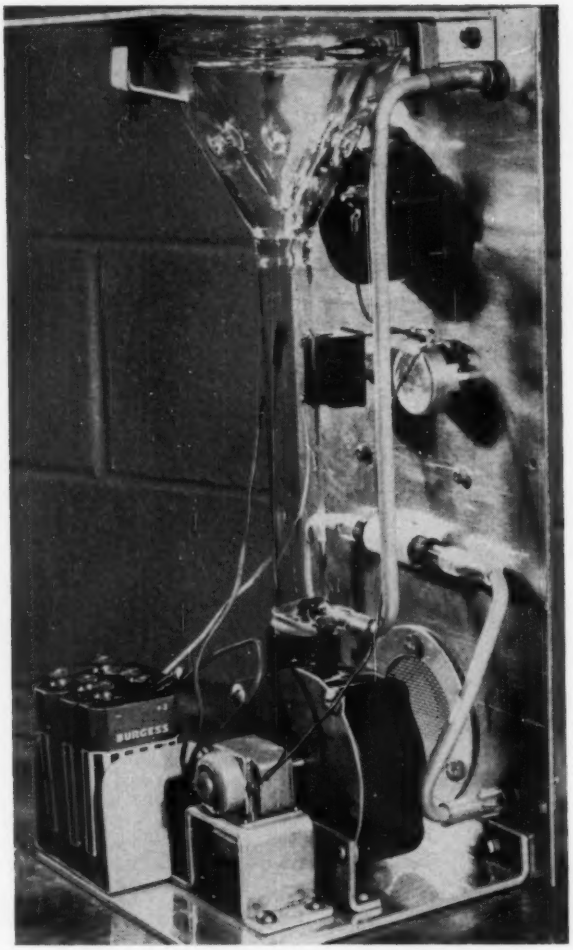


Fig. 3. Rear view of face plate assembly showing glass sniffer tube.

0-5 dc) is used to insure proper speed of the blower. An on-off toggle switch is mounted on the face plate for starting and stopping the blower.

Total weight of the odorometer is about 7 lb. A leather carrying strap is attached to the top of the case for ease in transporting the instrument. *Fig. 2* shows the back view (lower half) with the sliding panel in the up position for easy replacement of batteries when required.

Gas under a few inches water pressure is directed into the instrument by use of ¼-in. tygon tubing through a knurled hose connector on the face plate (see *Fig. 1*), then through ¼-in. aluminum tubing to a glass Fischer-Porter Flowrator No. 07-150/24 with glass float or No. 10A1017A with sapphire float, and finally through additional aluminum tubing to the stem of a glass sniffer tube. At this point, it is mixed with dilution air from the blower. The blower directs this air-gas mixture up through the top opening of the sniffer tube where the odor level test is made. The gas flow is controlled by a glass and teflon needle valve, the knob of which is located just below the name plate. The glass Flowrator tube mounted on the left side of the front face plate is protected with a clear lucite shield cut from a section of ¾-in. lucite tube.

The glass sniffer tube was fabricated by the Precision Optical Co., Rochester, N. Y., and consists of a large funnel (4-in. OD) with the top portion of a smaller funnel (2½-in. OD) welded inside. The upper edge of the larger funnel was rolled over the upper edge of the smaller one. This permits better mixing of the gas and air prior to sniffing. The bottom opening of the large funnel was fastened to a 6½-in. section of 22-mm. OD glass tubing. A cork with a ⅜-in. opening was inserted into the base of this tube in order to reduce the volume of air expelled at a given voltage setting. This cuts down on excessive air-flow, which reduces the sensitivity of the tester's olfactory nerves to odor changes.

Fig. 3 shows the rear view of the face plate assembly with the glass sniffer tube in place. Also, the other inner works of this instrument are clearly seen, i.e., motor, blower, batteries, tubing, and switch

mountings. As will be seen, this part of the odorometer can be removed easily from the carrying case.

All metal to metal, or metal to glass, connections have been made with Tygon tubing. The stem of the sniffer tube was fitted into the top opening of the blower, using a section connector of Gooch rubber tubing. The materials used in the odorometer were selected to be as free from odor as possible and not to absorb odors from surrounding atmosphere or odorized gas. A sliding aluminum panel is provided on the top of the instrument to protect the glass sniffer tube when not in use.

• Calibration of odorometer

Method I: Any gas chromatographic equipment can be used for this work. In our particular case, the Analograph was used to calibrate the ratio of gas as measured by the flowmeter and voltmeter settings. This instrument provides a quick indication of the percentage gas in terms of methane and ethane in the gas-air mixture at the outlet of the sniffer tube. The ratio of gas to air at three Flowrator settings and constant voltmeter readings can be obtained in one hour. A calibration chart showing Flowrator readings vs. corresponding percentages of gas in air at the established voltage is provided with each odorometer.

Method II: Since no chromatographic equipment was available for use prior to 1960, the calibration procedure involved the accurate measurement of the volume of air evolving from the sniffer tube with the odorometer blower operating at a definite voltage setting. This was done by connecting in series the sniffer discharge, a 10 light dry meter, and a vacuum pump. With the air blower turned on, the suction was so regulated that zero pressure was maintained at the outlet of the sniffer tube. Under this condition, the volume of air discharge per unit of time was measured. Since the Fischer-Porter Flowrator tube was supplied with a calibration curve, it was a simple matter to formulate a table of Flowrator readings vs. percentage gas in air mixture.

A check on the accuracy of this method of calibration was made by analyzing samples of gas-air mixtures taken at the outlet of the sniffer tube. The analysis involved measuring the total contraction and CO_2 produced per 100 cc. of gas-air mixture sampled. Since natural gas of known composition was used, the final percentage natural gas in the air-gas mixture was calculated. From this, the air rate in cu ft per hr was determined.

Table 1 presents a complete parts list for the RG&E portable battery-operated odorometer.

• Operation and Maintenance

Proper operation of this odorometer is quite simple. The procedure involves turning the toggle switch to the "on" position, adjusting the blower to the designated speed, and purging gas to be tested through the instrument for about 30 seconds by opening the glass and teflon control valve so that a maximum reading on the Flowrator is maintained. The gas control valve is then closed.

The tester sniffs the 100 per cent air close to the opening in the sniffer tube. While still sniffing the pure air, the gas control valve is slowly opened until the first change from ambient is sensed. This is repeated a couple of times. A Flowrator reading is taken and from the calibration chart provided with each instrument, the per cent gas in air value is obtained which represents the "threshold" odor level.

The gas control valve is then opened wider until the tester by continued short sniffs actually recognizes the odor as that of our odorized gas. A corresponding per cent gas in air concentration from this second Flowrator reading represents the "recognition" odor level.

No more than one or two sniffs of gas-air mixture at any one Flowrator setting should be made without clearing the olfactory system with fresh air. This eliminates any odor fatigue which might occur to the individual doing the testing.

Maintenance of this type of instrument has been at a bare minimum. Over the several years that the various odorometer models have been in use, they have retained their calibration very well. Personnel of non-technical background can easily be trained to run odor level tests with this type odorometer. Our experience has shown that regardless of the technical training of the person running the odor tests, if he has been given adequate instruction in the use of the odorometer, the results obtained by different individuals fall within a close range. ■

TABLE I. Parts for Odorometers

Item	Where Obtained
Glass sniffer tube	Precision Optical Co., Rochester, N. Y.
Weston voltmeter #1721, 0–5 v	Rochester Radio Supply Co., Inc.
Clarostat variable rheostat (A-43-10)	Rochester Radio Supply Co., Inc.
Burgess batteries (3) B2BP	Rochester Radio Supply Co., Inc.
Ripley Blower No. 2, clockwise, 3/16 shaft	Ripley Co., Inc., Middleton, Conn.
Uniperm 3-v electric motor	Edmunds Hobby Shop, Rochester, N. Y.
Glass and teflon valve, G-10428	Emil Greiner
Flowrator 07–150/24 or 10A1017A	Fischer-Porter Co.
On-off switch	Rochester Radio Supply Co., Inc.
Hose connector	Rochester Radio Supply Co., Inc.
Volt adjust knob	Rochester Radio Supply Co., Inc.
Plastic Flowrator shield	Rochester Plastic Center
Carrying strap and lock	Local Hardware Store
Aluminum case	General Maintenance Shop, RG & E

The writer wishes to express his appreciation to E. L. DeMeritt, a member of the chemical laboratory staff, and the general maintenance department for their assistance in the development and fabrication of this instrument. Also, acknowledgment is made at this time for the contributed thoughts and ideas of others who have carried on work in this field of odor evaluation.

CUT 20" CAST IRON PIPE
in Less Than 8 Minutes...

...with the New REED
ROTARY CUTTERS
(4 sizes cover the range from 10" cast iron to 26" steel pipe)

These one-man Reed Rotary Cutters cut large diameter steel or cast iron pipe *faster and better than the heaviest power machines* . . . and without electrical or explosive hazards. What's more, there's less digging in ditch-work! You need only a 4" to 6" channel under the pipe and a 45° to 60° arc for the handle swing. Reed Rotaries are easy to "carry in", too. The 20" size weighs only 68 pounds; separates into 3 easily carried parts. Patented pipe guide assures clean, right-angle cuts. Four razor blade wheels track perfectly, cut easily and are quickly interchangeable for steel or cast iron pipe.

Write today for descriptive literature.

These typical cuts on 12, 16, 20 and 24" cast iron pipe illustrate the clean, accurate, right-angle cuts provided by Reed Rotary Cutters.

REED MANUFACTURING COMPANY
ERIE • PENNSYLVANIA

corrosion • *Continued*

from page 19

than that of making broad, sweeping, overlapping, and often contradictory guarantees. The reputable manufacturer, because he knows his product has defects, and because he wants to stay in business indefinitely, is not likely to promise more than he can deliver. The charlatan, because he knows his product won't do anything, and because he expects to be in another business next year, will promise anything—or any combination of things, no matter how inconsistent they may be. His gadget will infallibly do just what you need to have done. One example was that of a household appliance which had the peculiar, and quite incidental, ability to humidify the air while it was performing its normal function. When it was pointed out to the demonstrator that one of the notorious and most unpleasant characteristics of the city where the demonstration was taking place was its excessive humidity, he barely hesitated before issuing the assurance that, in the case of high humidity, the device happily had the effect of *de*humidifying the air where it was used.

And so they go—the signs by which the snake oil peddlers can be recognized. The secret process, the pseudo-scientific terminology, the gross technical errors, the persecution complex, the accidental discovery, and the broad, sweeping claims.

Of course, this is not advice to steer clear of all new products and processes; this is advice to examine them critically, to use common sense. Any valid discovery will very soon appear in the literature in great detail—a really significant new development is more likely to appear first as a paper, or a set of related papers, at a national meeting. Later, when there is a salesman across the desk, he will have much detail technical data; he will know, or be able to find out, what goes into the process; and he will be aware of some of its limitations, and looking for others which may not have turned up. When this man turns up, his product is worth a trial, at least. ■

GAS DISTRIBUTION NEWS

Election effects

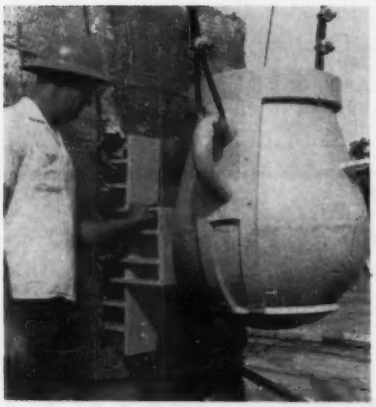
By NEIL REGEIMBAL
GAS Washington Bureau

THE coming sharp shift to the left in Federal government policies will raise new problems for the gas industry. Primarily, it's because the election results, by which President-elect Kennedy nosed into the White House, insure "liberal" factions, particularly labor unions, a large voice in the new Administration.

While the Republican-Southern Conservative coalition in Congress can damper some of the new Administration's policies, the White House—with a solid 2-to-1 majority in Congress—will call the shots. The "New Frontiers" of big government will begin developing early next year.

Based on Kennedy's campaign statements, traditional party objectives, and union demands, here's the outlook on specific issues of interest to the gas industry:

- The chance of any gas bill to free independent producers from utility controls is nil.
- Depletion allowances for gas and oil, after a "study," will probably be cut in spite of Lyndon Johnson holding the second spot.
- A fuels policy limiting industrial gas use is probable.
- Federal Power Commission will be revamped, with a strong "consumer" interest mandate from the new Administration. (This could nullify the new area pricing policy.)
- Business tax cuts are out the window and some increases are possible to pay for new spending programs.
- Labor laws will be eased to strengthen union bargaining.
- The minimum wage will be raised and expanded.
- A new flood of public power projects will be built.



Impact destruction tests at Operations Cryogenics consisted of lifting this 4340-lb wrecking ball to varying heights and swinging it against the side of a rectangular 9 per cent nickel-steel vessel filled with liquid nitrogen at —320 Deg F.

Operation Cryogenics introduces nickel-steel

International Nickel Co., Chicago Bridge & Iron, and United States Steel jointly put on a dramatic showing of a newly developed 9 per cent nickel-steel at the USS plant in Morrisville, Pa., in October. This product is of particular interest to the natural gas industry as it may help solve some of the problems foreseen in the construction of liquefied methane containers.

Under the heading of "Operation Cryogenics," the demonstration was conducted over two days at an outdoor test site. It was witnessed by some 300 representatives of the gas industry, the government, code regulatory bodies, metal working industry and other interested parties.

In the first-day test, a 6800-lb rectangular vessel, 8x8x6 ft, made from quenched and tempered 9 per cent nickel-steel ⅜ in. thick and in the as-welded condition, was filled with 1667 gal. of liquid nitrogen at —320 deg F. It was subjected to severe shock seven times by a 4340-lb "headache" ball. The kinetic energy of the weight (it was dropped from heights varying from 11 to 19 ft) ranged from 47,740 ft-lb to 82,460 ft-lb. The purpose of this test was to determine how much impact the vessel would absorb before rupturing. Such a failure did not occur.

On the second day, a nickel-steel cylindrical tank, 4 ft in diameter and 13 ft long, was filled with 1100 gal. of liquid nitrogen. With Linde Co. trucks supplying pumping pressure, the tank finally burst at 2160 psi, six times the design stress. At the start of this test, the nitrogen's temperature was —320 deg F, but it had risen to —302 at the time of bursting. With a burst stress of 132,200 psi, the 2750-lb tank shot some 30 ft across the test site and sent a nitrogen vapor cloud 200 ft.

L. B. Worthington, president of USS, said the test program had but one purpose—to demonstrate how tanks and full-size pressure vessels fabricated from 9 per cent nickel-steel will withstand shocks and extremely high pressures at low temperatures.

A spokesman for the program described the transportation and storage of liquefied methane by the gas industry as being a specific application of the new material which holds great promise.

Safety and economics were cited as being among the prime advantages of the new nickel-steel. This metal withstands the same impacts and pressures in its as-welded state as do carbon-steels in their stress-relieved state. Therefore, containers which may have been too large to have been stress-relieved in the past, would no longer need this process. This, in turn, brings on the economies. Prior to this, stainless steels and aluminum alloys have been used in far greater tonnage in fabricating pressure vessels for containing liquid gases. But, the per-pound cost of nickel-steel is about 31½-33 cents as compared with 55-60 cents for stainless steel.

Municipal plants hit new highs

AGA's annual summary of "Public Ownership Trends" shows that government ownership forged to a new high of 582* systems as of June 20, 1960. During the past year, 20 new city-owned systems were added. In the previous year, 57 new systems were added.

The number of states with municipal gas operations increased to 35 with the addition of one system in Wyoming. Increases in government ownership were reported in nine states, compared with 13 a year ago. One state, Michigan, reported a 1-city decline.

Reversing the trend of recent years, the percentage gain of gas industry revenues was above that of municipal operations. But, city-owned utilities continued to outpace the industry's growth percentagewise in sales volume and number of customers.

Municipal utilities with gross revenues of $25,000 or more added 84,600 customers during 1959 to reach a new high of 2,220,200 (up 3.9 per cent). The gas industry generally acquired 823,900 new customers, up 2.6 per cent to 32.1 million.

Government-owned utilities increased their gas sales 416 million therms to 4.9 billion, a jump of 11.6 per cent. The industry's sales rose 7.6 billion to 87.9 billion therms for a 9.5 per cent increase.

A sizable gain of 20.3 million in revenues was recorded by the municipals, for an 8.1 per cent jump over the 1958 year-end figures. Total revenues were $269.6 million. Gas industry revenues generally rose $496.9 million to $8.5 billion, a gain of 10.9 per cent.

Government ownership remained strongest in the southern states, but increases were noted in other regions. Kansas added 5 municipal operations during the year, Oklahoma added 3. Florida showed the greatest increase with 7 new city-owned systems.

No new municipal systems were reported in the New England, Middle Atlantic, or Pacific states.

Alabama continues to have the greatest concentration of municipal plants with 78. Tennessee is second with 62. The East South Central states have a total of 200 municipal gas plants. Louisiana in the West South Central region also has 62.

Greatest gains in municipal ownership continue to be made in less populated areas. A special study made last year showed that 95 per cent of all municipal systems are in communities of less than 25,000 population. But, gains in these smaller cities with municipal plants have been larger percentagewise in sales and customers than the gains of the gas industry as a whole.

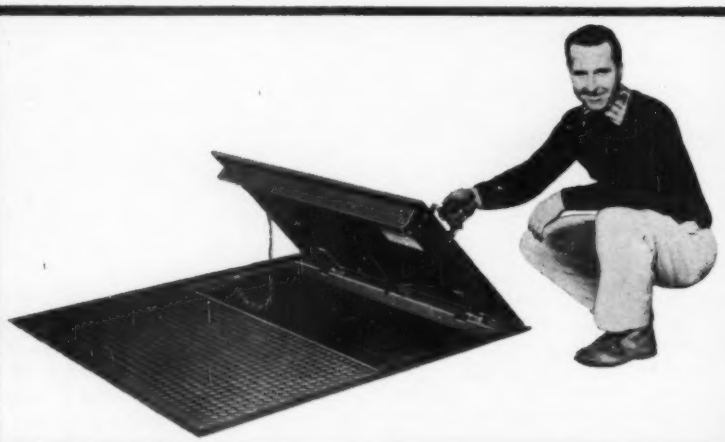
*Based on systems of all sizes. Statistics on customers, sales, and revenues are based on city-owned systems with annual revenues of $25,000 or more.

Newspaper ads tops

Philadelphia (Pa.) Electric Co. won the Socrates High Award of the Year for the consistently outstanding quality of its newspaper advertising. The 43-year-old Socrates award is presented annually by *Public Utility Ad-Views.*

Among finalists were Cincinnati Gas & Electric, Iroquois Gas Corp., Buffalo, N. Y.; Consolidated Edison Co. of New York; Dayton (Ohio) Power & Light; and Lone Star Gas Co., Dallas.

Springs PROVIDE EASIEST ACCESS TO METER & VALVE PITS!



BILCO DOORS have springs for easy opening and built-in drainage for complete weathertightness. Available in a variety of sizes in single or double leaf design.

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Please send FREE catalog with specifications and prices on Meter & Valve Pit Doors.
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DOORS FOR SPECIAL SERVICES

Coalmen react to Ligon's declaration

Wister Ligon's declaration in Atlantic City that the gas industry would continue to oppose the proposed National Fuels Policy Study drew immediate reaction from the coal industry. Ligon said the study was intended to deprive consumers of the right to choose between competing fuels in an open market.

Joseph E. Moody, president of the National Coal Policy Conference, invited the gas industry to meet with him and discuss the whole question of domestic fuels and the problems facing them. And, he urged AGA members to support a study by Congress of these matters for the mutual benefit of all fuels industries.

Moody claimed that his group "is not supporting any new or additional legislation which we anticipate would deprive consumers of their right to choose between competing fuels. . . . However, it seems obvious that the crucial problems now facing all domestic fuels industries demand that a fuller understanding of all factors affecting them be reached for our own national protection. . . ."

N. J. Natural adds 50,000th heat customer

New Jersey Natural Gas Co.'s 50,000th heating customer was a conversion job from oil to gas. A gas-fired hot water unit with copper baseboard radiation was put into a five-year old home in Neptune City, N. J.

W. Daniel Williams, vice president in charge of sales and commercial operations, pointed to the installation as a "milestone in the tremendous growth of acceptance of gas for home heating. Just imagine, eight years ago our company had only 10,032 heating customers. That means we have been averaging an increase of about 5000 heat customers a year. Many of these are in new homes built in our area, and others are conversions from other types of heat."

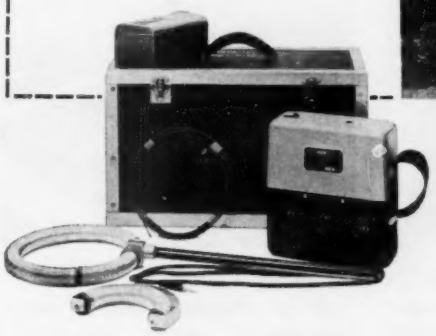
City accepts bid

The Moses Lake (Wash.) city council accepted Cascade Natural Gas Corp.'s bid for purchase of the city's natural gas system. The Seattle company bid $1.2 million for the system.

Continued on page 79

Maintain Coating Application Standards

INSPECT WITH A TR HOLIDAY DETECTOR!



EP HOLIDAY DETECTOR
Portable, "damp-climate," pulse type holiday detector for coated surfaces.

To obtain maximum protection and hold maintenance costs to a minimum, inspect protective coating with a Tinker & Rasor Holiday Detector and make repairs before backfilling. Minutes spent inspecting the pipe with a Tinker & Rasor Holiday Detector while the ditch is open can save days making repairs later on. Clearly, if protective coating is desirable, the best possible protective coating is *most* desirable.

Every holiday in your protective coating increases the current requirements of cathodic protection. The result is constantly increasing maintenance costs.

Insure your pipeline's future with inspection by Tinker & Rasor Holiday Detectors. Write today for technical data and bulletin.

Engineering Note:
To insure a successful application, your specification should include TR Holiday Detector inspection. Write for specification guide.

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Canadian Equipment Sales & Service Co. Ltd., Edmonton, Alberta, Canada
Export Agent: Frazar & Hansen Ltd., San Francisco, Calif.

Quality control for coating application
TR TINKER & RASOR
417 Agostino Road, P.O. Box 281 • San Gabriel, California

GAS DIGEST

New Products and Trade Literature

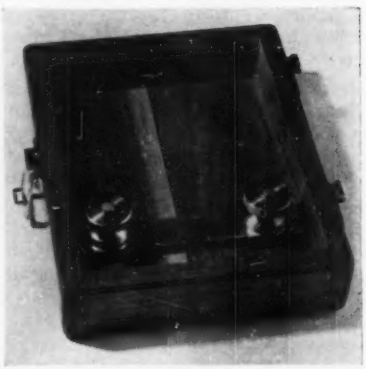
For more data on any of these items use the Readers' Service Card on pages 77, 78

1. Meter tube check

A new measuring tool kit checks orifice metering assemblies against tolerances recommended by AGA and ASME (GEC-570). With the 27-piece kit (including the Daniel Bean orifice edge gauge), you can measure meter tube diameters and lengths, meter tap holes, orifice plate bores, etc.
Daniel Orifice Fitting Co.

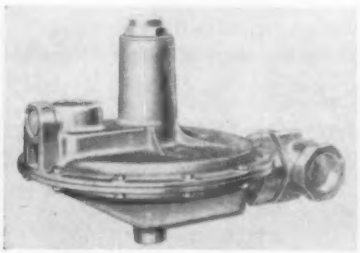
3. Surface cooking

In the Blanket-O-Flame range, required air supply comes from within the burner itself, making it possible to tightly seal burners in the burner pan (GEC-240). A "blanket" of air cushions heat and distributes it evenly across any shape pan for smooth, all-over cooking without hot spots.
Whirlpool Corp.



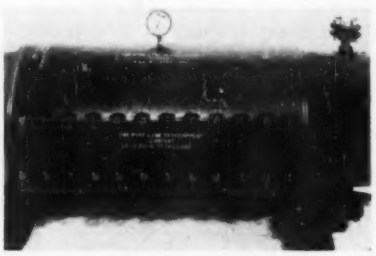
5. Voltmeter shunt

Agra's shunt is ideal for testing current on cathodic protection systems when the amperage exceeds 5.0 amps (GEC-110). The 50-amp (maximum), 100 millivolt type shunt is designed to fit permanently into the lid of the Agra pipe-to-soil voltmeter. Length of the shunt is 5 in.
Agra Engineering Co.



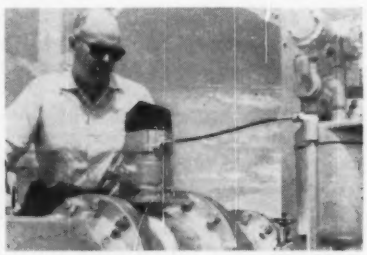
2. Service regulator

Fisher's Series S200 gas service regulators were designed with larger commercial and industrial uses in mind (GEC-700). The 1½- and 2-in. body size regulators, available in six variations, feature exceptional stability under shock load conditions often encountered in such installations.
Fisher Governor Co.



4. Split sleeve

The Smith split-sleeve is now available in extra-long size—24 in. in diameter by 54 in. long (GEC-370). Ends of the split-sleeve are turned down for fillet-welding to pipe. Side bar spaces and bolts may be completely seal-welded, and welding may proceed with pipeline in service.
Pipe Line Development Co.



6. Turbine-type meter

Rockwell Manufacturing has expanded its line of turbine-type meters for measuring oil products with the addition of a 10-in. Turbo-Meter (GEC-560). New design features include a highly sensitive rotor metering element weighing only 4 lb and a newly developed viscosity compensator.
Rockwell Manufacturing Co.

7. Gas refrigerator

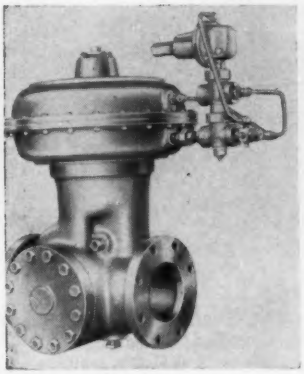
Sears has introduced its new gas-operated refrigerator - freezer (GEC-690). The new Coldspot is a 13-cu ft, two-door model featuring frostless freezing, aluminum slide-out shelves, and an automatic ice-cube maker. An all-around magnetic door gasket provides air-tight seal.
Sears, Roebuck & Co.

8. Aluminum drill pipe

Use of aluminum drill pipe enables existing drilling rigs to operate more economically and efficiently (GEC-300). The first commercial test of a full drill string made of aluminum proved successful. The Reynolds aluminum pipe was fitted with special tool joints from Reed Roller Bit Co.
Reynolds Metals Co.

9. Regulators

Reliance Regulator's Series 1200 4-in. diaphragm class regulator was developed for compact domestic metering settings (GEC-700). It has a 270-cfh capacity. Available in both standard vent model and full capacity internal relief model with ¾-in. weatherproof screened vent.
Reliance Regulator Div.



10. Relief valve

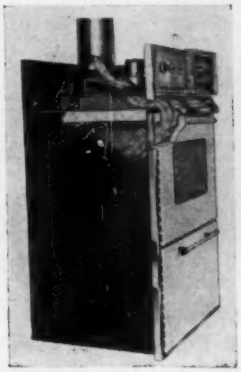
A new high pressure, high capacity relief valve, Type 29H, is introduced by Fisher Governor (GEC-820). While similar to Fisher's Type 29, the new valve protects lines with pressures up to 50 psi in the 3-in. size. Capacity is 1,605,000 scfh of 0.6 sp gr gas at 35 psi in the 6-in. size.
Fisher Governor Co.

11. Line stopper

A new line stopper tool is designed to salvage pressure control fittings (GEC-650). Clamp-on mechanical plug fitting can be removed and reused. The tool seals off line in front of pressure control fitting, making it possible to remove fitting before blanking off the line.
Overton Sales-Equipment Co.

12. Valve operator

Wachs' portable Pow-R-Drive for opening and closing valves is a heavy duty unit weighing only 38 lb (GEC-820). It is easily picked up and handled by one man. Ruggedly built to stand up on tough field jobs, the portable Pow-R-Drive can be used in the most inaccessible locations.
E. H. Wachs Co.

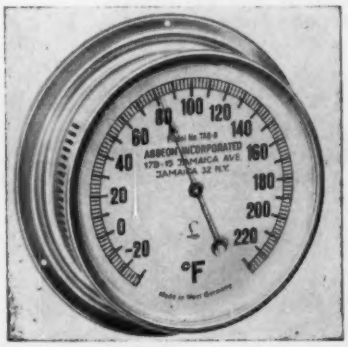


13. Gas oven

Samuel Stamping's Suburban Viscount is a 21-in. built-in oven offering a new concept in cooking (GEC-240). Equipped with a built-in fan vent, the Viscount exhausts cooking smoke, grease, and heat outside the home. Result is a cooler, cleaner kitchen, and cool oven doors.
Samuel Stamping & Enameling.

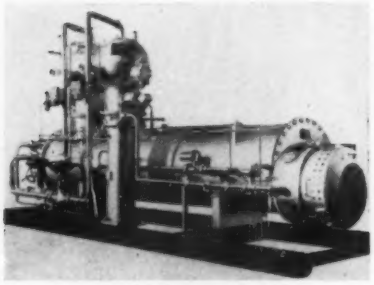
14. Air conditioner

Arkla's new Sun Valley Model 500C year-round gas air conditioning unit permits remote, outside installation (GEC-020). The 500C combines the condensing unit, including the evaporative cooler, inside its all-weather panels with the refrigeration and heating system.
Arkla Air Conditioning.



15. Thermometer

A new wide range thermometer measures from minus 30 deg F to plus 230 deg F (GEC-540). The ruggedly built thermometer has a 6½-in. dial, easily visible across a large room. Overall diameter is 7¾ in. and it is 2½ in. deep. The thermometer weighs 1½ lb with a solid brass casing.
Abrax Instrument Corp.



16. Wellhead unit

BS&B has a new dual wellhead production unit that processes two separate wellstreams simultaneously (GEC-300). The Free-O-Freeze "Double Dip" unit has two spherical separators integrally mounted on one indirect-fired heater. Trouble-free cold weather operation is featured.
Black, Sivalls & Bryson.

19. Mobile radio

Aeronautical Electronics has a new 15-watt VHF-FM mobile radio set (GEC-140). Less than 5 in. high, the Slimline fits under the dash in any car or truck, including the compacts. It has a maximum of three transmit and receiver channels with built-in provision for selective-call system.
Aeronautical Electronics.

22. Explosion protection

Fenwal's new protective system offers active, rather than passive, protection against accidental explosions (GEC-710). The system detects an explosion at the instant of its inception, and acts within a few thousandths of a second to literally snuff it out before it becomes destructive.
Fenwal Inc.

17. Service bodies

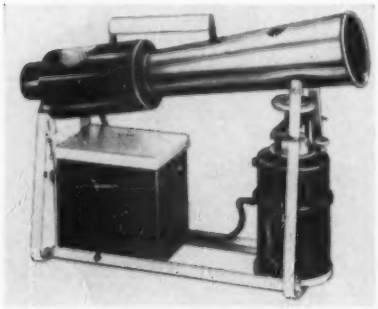
McCabe Powers is producing a modernized Series 44-G Powers-American service and maintenance body (GEC-790). Adaptable to a wide variety of operations, the body's compartment space allows for orderly storage of all tools and supplies normally needed.
McCabe Powers Body Co.

20. Pipe cutter

A new "Super" hydraulic pipe cutter is designed for use on 10- through 20-in. cast iron pipe (GEC-650). Wheeler's "Squeeze and Pop" principle is used. The unit is readily installed on the pipe by two men and the pipe is quickly and easily cut by one man.
Wheeler Manufacturing Corp.

23. Pickup truck

A new type integral cab and body is featured in Ford's new 1961 light-duty, F-100 Styleside pickup (GEC-790). Cabs are 2 in. wider, 4 in. lower, and have lower step-in heights at no sacrifice in ground clearance. Load space is increased 9 cu ft.
Ford Div.

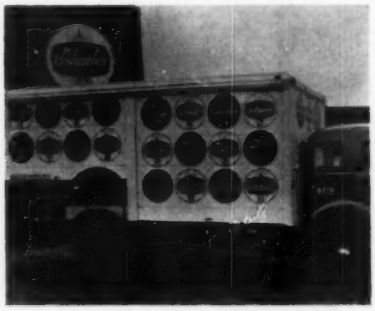


18. Automatic scarecrow

The Zon automatic scarecrow rids compressor stations, etc., of birds (GEC-500). A valve regulates flow of acetylene gas into combustion chamber. When enough gas accumulates, it is automatically released and a spark is ignited, making a small but loud explosion.
B. M. Lawrence & Co.

21. Computer unit

Conventional typed and printed information can be read directly into a computer by the IBM 1418 optical character reader (GEC-180). It converts numerical printed data to computer language which it feeds to a magnetic tape computer for processing.
IBM Corp.



24. Roll-up doors

Roll-up doors make for fast and easy loading of trucks and are available for any type truck or trailer (GEC-790.) Truk-A-Doors are made of panels of aluminum and coated steel bonded to plywood. They are spring balanced for easy lifting, and are weather-stripped.
Truk-A-Door Co.

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TRADE LITERATURE

25. Corrosion problems

A data file on corrosion control has been assembled by Chase & Sons (GEC-130). The guide to solving pipe corrosion problems describes five products with particular emphasis on Chasekote and Chasewrap.
Chase & Sons Inc.

26. Meter runs

Aitken's orifice meter runs are described in a 4-page bulletin (GEC-560). Specifications, photos, and descriptive information are included.
M. N. Aitken Co.

27. Lubricated plug valve

A kit consisting of four bulletins covering many aspects of the lube valve is available from Walworth's newly created lubricated plug valve division (GEC-820). The 2-color, illustrated bulletins are titled Service Fleet, Rolotork, High Strength Cast Iron, and Lubricating Manual.
Walworth Co.

28. House regulators

A 4-page Bulletin 104 describes Type K Reliance regulators for house service installations (GEC-700). In addition to describing Type K, the bulletin discusses another model available for low pressure pilot duty. Major design features are covered.
American Meter Co.

29. Odorants

A comprehensive compilation of useful information on gas odorants has been published by Pennsalt Chemicals (GEC-590). The 28-page booklet includes background information on odorants, physical characteristics, handling and control methods, and storing.
Pennsalt Chemicals Corp.

30. Draft control

"Still day efficiency" for all heating units is claimed by Moran's positive draft control (GEC-840). The company's Catalog No. 10 describes positive draft control, draft equalizing stack heads, and flash arresters.
Moran Furnace & Sheet Metal.

31. Record books

Truck cost record books and forms for driver daily reports are available from International Harvester (GEC-600). The truck cost record book allows an accurate record to be kept of all fixed, operating and maintenance charges against one truck for one year. The driver daily report covers number of trips, trip time, stops, mileage, loads, and fuel and oil consumption.
International Harvester Co.

32. High pressure regulators

Reynolds 8275 series of high pressure service gas regulators are described in bulletin 8275-IR (GEC-700). The illustrated bulletin contains information on use and installation, models and features, capacity tables, spring data, and dimensions.
Reynolds Gas Regulator Co.

33. Pipe detection

"Typical Pipe Detection Problems and Their Solution" is a 24-page illustrated book from Computer - Measurements Co. (GEC-640). A how-to-do-it-guide, the pocket-size book tells how to locate, trace, center or determine the depths of pipes.
Computer-Measurements Co.

34. Algebraic compiler

A self-teaching manual makes it possible for engineers and scientists to master the Bendix G-15 ALGO compiler (GEC-180). The 32-page manual describes the language of ALGO and sets forth procedures for the representation of numerical data and control statements.
Bendix Computer Div.

35. Pipe fitters manual

Information expected to be at the finger tips of modern pipe fitters and welders is concentrated in a 72-page Pipe Fitters Manual from Tube Turns (GEC-370). Text, tables, and illustrations in the pocket-size field manual give important methematical, physical, chemical and metallurgical data and related design, layout and mechanical information at a glance.
Tube Turns Div.

news • *Continued*

from page 73

Mississippi Valley installs digital logger

Mississippi Valley Gas Co. has added automatic dialing and digital logging equipment to its selective call telemetering facilities.

Selective call telemetering has made possible the monitoring of 49 flow variables from 23 key stations at distances up to 300 miles from the company's Jackson dispatching office—using only one long-distance telegraph channel and a minimum number of connecting lines. The new dialing and Data-Master logging equipment provides for fully automatic sampling and digital translation of the telemetering data.

The communication and logging system was developed cooperatively by the Bristol Co., Waterbury, Conn., and Southern Bell Telephone. It is expected to reduce operating costs, eliminate human error in data interpretation and recording, and provide a more dependable, regular monitoring of distribution system conditions.

AGA, ASA developing industrial gas standards

AGA and the American Standards Association are going to develop national standards for the installation and utilization of industrial gas equipment. Plans were announced following the first meeting of a new Sectional Committee Z83 set up under ASA procedures.

Chairman of the committee is Robert A. Modlin of East Ohio Gas Co.; vice chairman is E. L. Spanagel of Rochester Gas & Electric Corp.

KPL's mental health work honored

Kansas Power & Light Co., Topeka, has won a certificate of merit from the Kansas Association for Mental Health for its pioneering contribution to mental health in industry.

John G. Williamson, KPL's vice president in charge of operations, accepted the award for the company.

KPL recently was the subject of a four-year research study conducted by the Menninger Foundation in Topeka.

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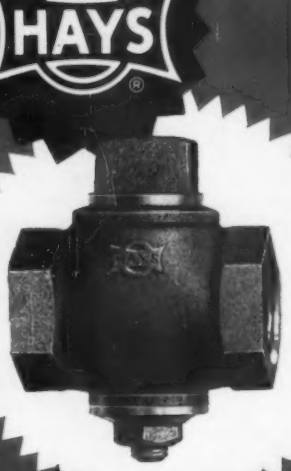

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GENERAL PRODUCTS DIVISION
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Jerry Broking, Arizona Public Service Co. commercial and industrial salesman at Douglas, thinks it's a natural to use natural gas to light natural gas irrigation pumping engines. "For a minor cost," Broking said, "it gives dependable light for handy night checking and maintenance chores, plus protective lighting against pilferage." Shown is the first used by an engine on the company's system.

These five remote telemetering station units are part of Milwaukee (Wis.) Gas Light Co.'s digital data system, designed and built by Datex Corp., Monrovia, Calif. The system will automatically record at a central dispatching office the total gas flow from each station on a pre-selected time basis. Commercial telephone lines will be used. In the photo, the Bristol Flow Totalizers have yet to be installed. The teletype page printer to be used at the central office is in back.

Michigan Consolidated Gas Co.'s exhibit at the National Automobile Show in Detroit marked the first time the gas industry has exhibited at an auto show. Some 1.4 million people saw the display, which showed the gas industry's contribution to the auto industry through a series of large photos.

NFPA revises fire codes

The 1960-61 edition of the National Fire Codes has been issued by the National Fire Protection Association. The 7-volume edition is a compilation of the 181 standards developed by NFPA in the fields of flammable liquids and gases; combustible solids, dusts, chemicals and explosives; building construction and equipment; extinguishing equipment; electrical installations; and mobile fire equipment, transportation and management.

Additional information on the codes ($7 per volume, $40 for the set of seven volumes), is available from Publications Department, NFPA, 60 Batterymarch St., Boston 10.

Data simplifies measurements

A complete set of combined Reynolds Number and Expansion Factors is contained in "Simplified Fr-Y Factors" by John P. Squier. The information is compiled from basic AGA formulae to save time and labor in gas measurement calculations.

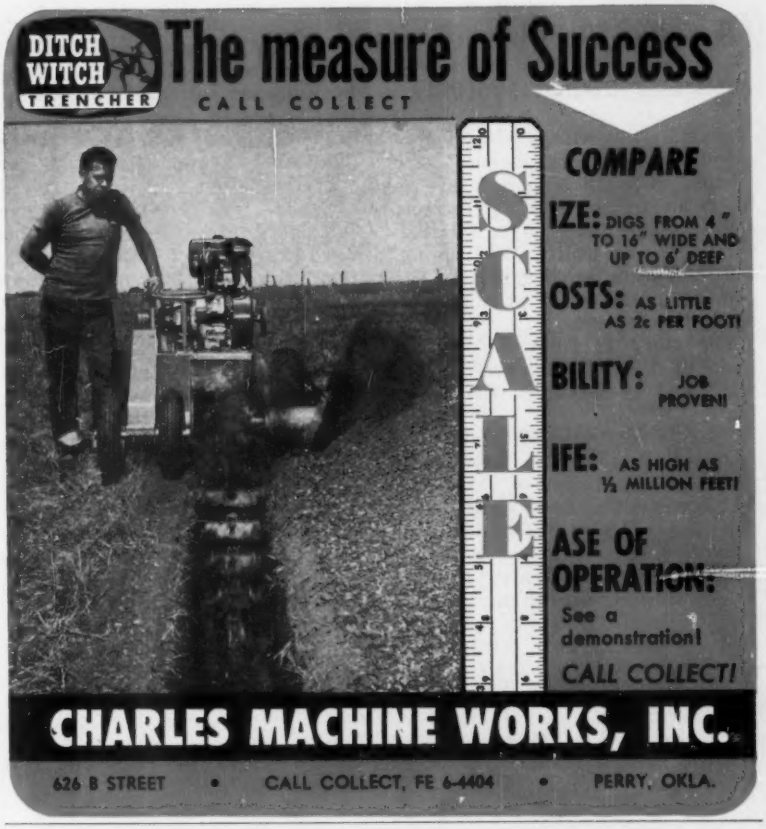
Tables are especially adaptable to installations where there is variance in pressures or differentials from day to day, and for operators who incorporate such factors in the hourly meter coefficient. The book contains over 56,000 factors individually computed and combined on data processing equipment.

Additional information on the book (78 pp, $25) is available from John P. Squier Co., Gas Measurement - Engineering Service, Box 6100, Dallas 22.

Kansas commission restricts conferences

The Kansas Corporation Commission has restricted private conferences and interviews with commission examiners and commissioners who decide cases before the commission.

The rule requires anyone discussing a pending case with a commissioner, examiner, or hearing officer to give "reasonable notice" to other parties in the case. If such notice is not given, the commissioner, examiner, or hearing officer must take notes on the conference and put them in the file so that others may read them.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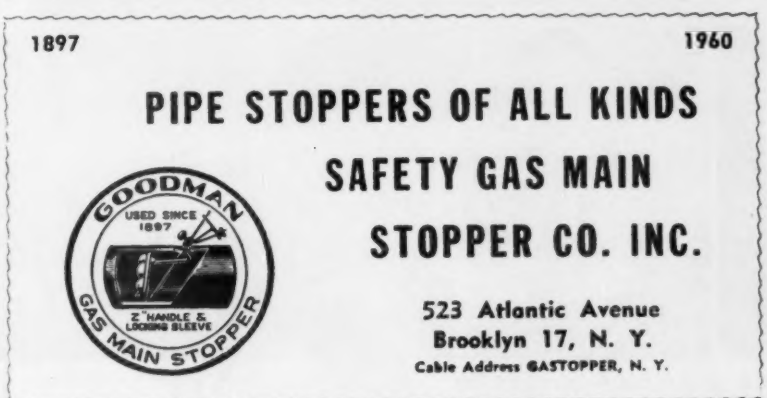

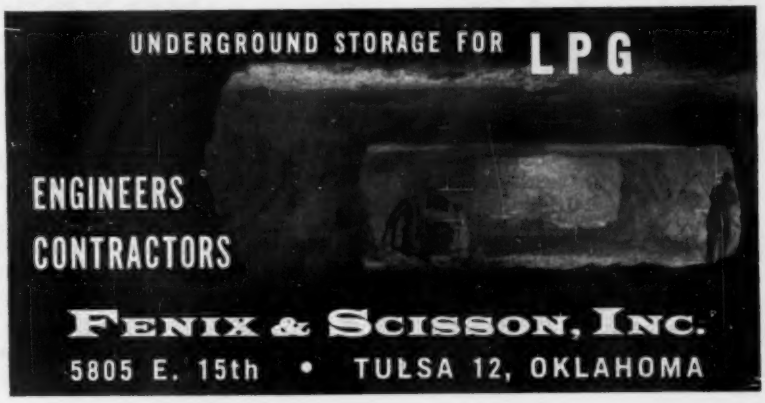

All is not so bright with city owned systems

John T. Bills, vice president, corporate relations of Peoples Gas System in North Miami, points to the following story as a prime example of how and why the facts of municipal gas utility construction and operation seldom attain the glowing profit goals promised in feasibility reports.

The story is from the Oct. 7 issue of the "Tallahassee Democrat" and is datelined Marianna, Fla.:

"Convinced that it's going to take more time than he could spare to straighten out the city's financial problem resulting from installation of a natural gas system, Mayor-Commissioner John L. McFarlin Jr. has resigned, effective Jan. 3.

"He will have served one year of his two-year term and will have served a total of five years on the city commission. . . .

"Mayor McFarlin explained that he opposed from the beginning the sale of $671,000 in revenue certificates to finance installation of a natural gas system.

"Of this amount, $120,000 was earmarked for extension of natural gas facilities to Graham Air Base but this was not spent because the base is closing down.

"The mayor said 1400 people paid $5 each and 'signed up' for natural gas but were not required to pledge that they would become customers. He said that gas lines were extended to all these prospective customers and 1400 meters were purchased but at the present time only 400 actual consumers are on the city books.

"Revenues from gas sales and from the present 10 per cent utility tax were pledged to pay off the indebtedness. Mayor McFarlin said it now appears gas revenue will be insufficient to meet the payments and that the city will be forced to dip into the utility tax revenue.

"This, he explained, will reduce revenue for general government operation and can be expected to force up the city ad valorem tax rate which has remained at 21 mills the past several years.

"It was estimated originally, he said, that at least 1200 gas customers would be necessary to pay off the certificates from gas revenues alone.

" 'Financial reports indicate we are now losing money on our gas operations,' the mayor said, 'and it's going to take a lot of the commissioners' time during the coming year to try to get this matter straightened out. We don't even have a minimum charge for gas customers.'

"Natural gas is purchased from the Houston Gas Corp. and became available in Marianna about six months ago. Since that time the company has applied for a rate increase. . . ."

'59's marketed production up 9% over 1958

Bureau of Mines reports that marketed production of natural gas in the U. S. totaled 12,046 billion cu ft in 1959, up 9 per cent over 1958.

Total consumption in 1959: 11.8 billion cu ft, up 10 per cent.

Interstate shipments (including exports): 7176 billion cu ft, up 11 per cent.

Average wellhead value: 12.9 cents per Mcf, 1.0 cent over 1950.

Average value at point of consumption increased from 46.2 cents in 1958 to 47.7 cents in 1959.

4 models: Standard no-seal; automatic cutoff; full capacity internal relief; internal relief and automatic cutoff combined.

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Cincinnati

S. T. Olinger
Cincinnati

R. W. Alexander
Cincinnati

Charles Stubbs
Mobile Gas

J. ROBERT DELANEY has been promoted to the new post of manager of Cincinnati (Ohio) Gas & Electric Co.'s gas department. The former manager of the gas sales division has been with Cincinnati Gas since 1919. In his new assignment, Delaney is responsible for operations, engineering, and sales. In other promotions, STANTON T. OLINGER, Delaney's assistant, was put in direct charge of the gas sales department. And, ROBERT W. ALEXANDER, supervisor of the gas engineering division, was named assistant manager of gas operations.

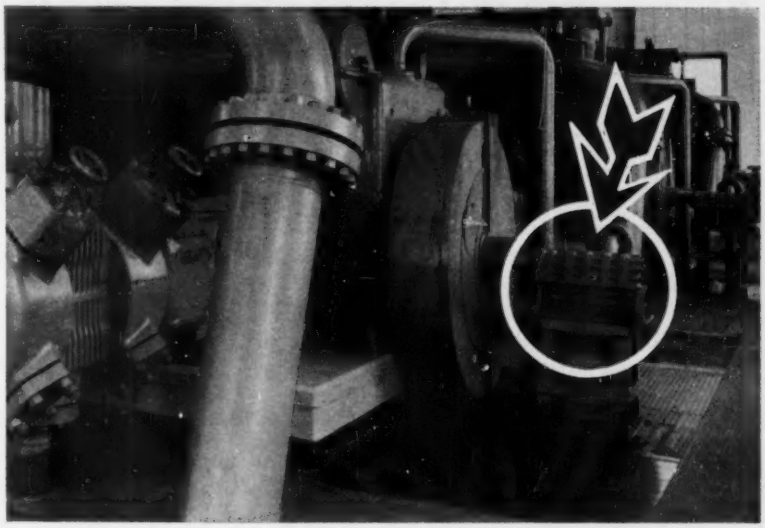
A. E. TOWNSEND has been named supervisor of transportation of the Columbia Gas System Service Corp., with headquarters in New York. He formerly was coordinator of motor vehicles for the service corporation at Columbus, Ohio. Townsend and WALDO A. SHIPMAN, coordinator of communications and tele-control, will report to vice president L. E. Heckman.

RICHARD C. VIERBUCHEN is the newly named director of sales for Washington (D. C.) Gas Light Co. He succeeds HERBERT H. MCMURRAY, who has retired after 30 years with the company.

HAROLD B. CORNWELL is the new southeastern district manager for Ohio Fuel Gas Co., Columbus. He succeeds FRANK W. PHILLIPS, who has retired. Cornwell headquarters in Athens. Phillips managed the southeastern district for 28 years.

CHARLES F. STUBBS, former chief engineer of Alabama Gas Corp., Birmingham, has been elected president and chief executive officer of the Mobile (Ala.) Gas Service Corp. Stubbs, who was also named a director, succeeds KENNETH R. TEELE, who has resigned. B. D. WILLIAMS, formerly executive vice president, treasurer, and director of Mobile, becomes chairman of the board of directors. EDWARD B. JACKSON was promoted from assistant treasurer to treasurer.

JAMES J. CONDON is a newly elected assistant vice president—sales division—of the Peoples Gas Light & Coke Co., Chicago. Condon has been manager of the domestic sales department. He is succeeded in that post by ROBERT L. INGEMAN, who has been manager of the commercial sales department. FRANCIS J. DAWSON, formerly supervisor of industrial sales, succeeds Ingeman in the commercial sales post.



Berry Hydraulic Fan Drives used in remote control compressor station

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To reduce installation costs Berry now offers 21 internal gear ratios. This permits direct connection of hydraulic pumps at prime mover speeds from 250 RPM to 1750 RPM. Hydraulic motors may be direct connected to fans, water pumps, etc., from 100 to 2000 RPM.

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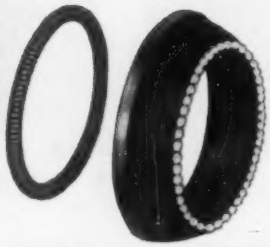

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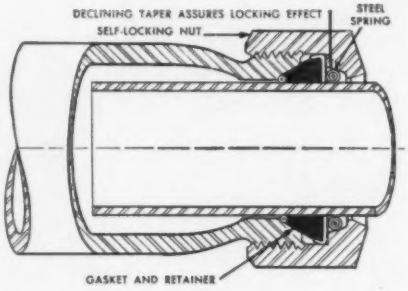

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Write for detailed data, or inquire about possible adaptations of the NORMAC Self Locking Joint.

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Henry L. Ford
Eastman

L. K. Eilers
Eastman

HENRY L. FORD is the newly elected president of Eastman Chemical Products Inc., Kingsport, Tenn. He succeeds DR. L. K. EILERS, who has become vice chairman of the board of directors. Ford has been a vice president of Eastman Chemical and Eastman Kodak since 1958. He began his association with Tennessee Eastman in 1922. Dr. Eilers is first vice president of Tennessee Eastman and Texas Eastman.

LEWIS R. GATY has been elected vice president in charge of engineering and research at Philadelphia (Pa.) Electric Co. He has been serving as vice president of research and development since 1956 and now assumes the additional responsibility for the engineering organization of the company.

DR. PHILIP ANDERSON has been elected vice president in charge of research and development for Arkla Air Conditioning Corp. in Evansville, Ind. Dr. Anderson has been serving as chief engineer for Arkla's research and development program for the past year.

WILLIAM D. CARLSON has been promoted to district supervisor for Heath Survey Consultants Inc., Wellesley Hills, Mass. His area consists of eastern Pennsylvania, New Jersey, Delaware and Maryland.

ALLAN P. GOOD has been elected assistant controller of Northern Indiana Public Service Co., Hammond, Ind. He succeeds the late IRVING E. FASAN.

LINDLEY K. NICHOLS has joined the management consulting division of Ebasco Services Inc., New York, as chief consultant.

HAROLD R. LAUER has been named supervisor of the builder management division of Michigan Consolidated Gas Co., Detroit. He will work with home builders and apartment management companies.

W. D. Carlson
Heath

Lewis R. Gaty
Philadelphia

WILLIAM F. GULLEY has been named assistant regional manager in the western region for Rockwell Manufacturing Co.'s Meter & Valve division. NELSON E. DAVENPORT succeeds Gulley as San Francisco district manager.

C. H. SMITH, superintendent of gas production and plants for Kansas Power & Light Co., Topeka, is retiring after 31 years with the company. Succeeding him as superintendent of plants in Kansas Power's gas division is JAMES C. RAUCH, who has been an engineer in the gas division since 1958.

EDWARD E. BAGLEY has been appointed sales manager of Reynolds Gas Regulator Co., Anderson, Ind. Prior to joining Reynolds, Bagley was chief of operations of Northern Ontario Natural Gas Co., Toronto, Canada. He began his career with Arkansas Louisiana Gas Co.

WILLIAM W. SHADE is district manager in the Kansas City, Mo., area for Rockwell Manufacturing Co.'s Meter & Valve division. He formerly was a sales engineer in the district.

CLIFFORD P. CLELAND has been appointed lease and right-of-way agent by New York State Natural Gas Corp. HARRY B. CHEESMAN succeeds Cleland as lease and right-of-way supervisor for the northern division. Cleland's new headquarters are in Pittsburgh, while Cheesman will be at the Sabinsville, Pa., office.

T. H. EVANS has been elected president of Carnegie Natural Gas Co. and Apollo Gas Co., Pittsburgh. He succeeds HARLAN H. PIGOTT, who is retiring after serving as president of the two U. S. Steel subsidiaries since 1953. Before joining Carnegie and Apollo as vice president in 1957, Evans was vice president of Equitable Gas Co. and Kentucky-West Virginia Gas Co.

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Five promotions have been announced in Pacific Gas & Electric Co.'s gas department. KENNETH B. ANDERSON, former superintendent of technical services, becomes manager of pipeline operations. He succeeds RALPH S. NABORS, who has become field supervisor of PG&E's affiliate, Pacific Gas Transmission Co. Nabors will headquarter in Spokane, Wash. ROSCOE D. SMITH was promoted from general superintendent, transmission and distribution, to manager, gas system design. EDWARD F. SIBLEY moves up to manager, gas distribution, from his former duties as supervising administrative engineer. ROBERT W. BROOKS, former northern division superintendent of pipeline operations is now supervising administrative engineer.

JAMES DVORACEK has been named midwestern regional manager for Rockwell Manufacturing Co.'s Meter & Valve division. Dvoracek, who will headquarter in Tulsa, was formerly assistant southwestern regional manager.

CARL H. JENKINS has been named assistant general sales manager of the Gas Service Co., Kansas City, Mo. For the past four years, Jenkins has been manager of the Topeka division.

ANDREW C. THOMAS heads Jaeger Machine Co.'s new product development as vice president. With the Columbus, Ohio, company since 1940, Thomas has been assistant general sales manager for the past five years.

BRUCE FEARN has succeeded PAUL J. BLANC as supervisor of Philadelphia Electric Co.'s residential and commercial sales department.

Deaths

DONALD F. KURTZ, manager of Philadelphia (Pa.) Electric Co.'s rate and standard practice division, in a plane crash in October. Kurtz joined Philadelphia Electric in 1922.

EARLE N. SCOTT, 58, purchasing manager of Long Island Lighting Co., Mineola. Scott had been with LILCO since 1933.

CARL E. HARTLEY, 53, vice president and general counsel for East Tennessee Natural Gas Co., Knoxville. Before joining East Tennessee in 1950, Hartley was secretary of the Central Indiana Gas Co., Muncie, Ind.

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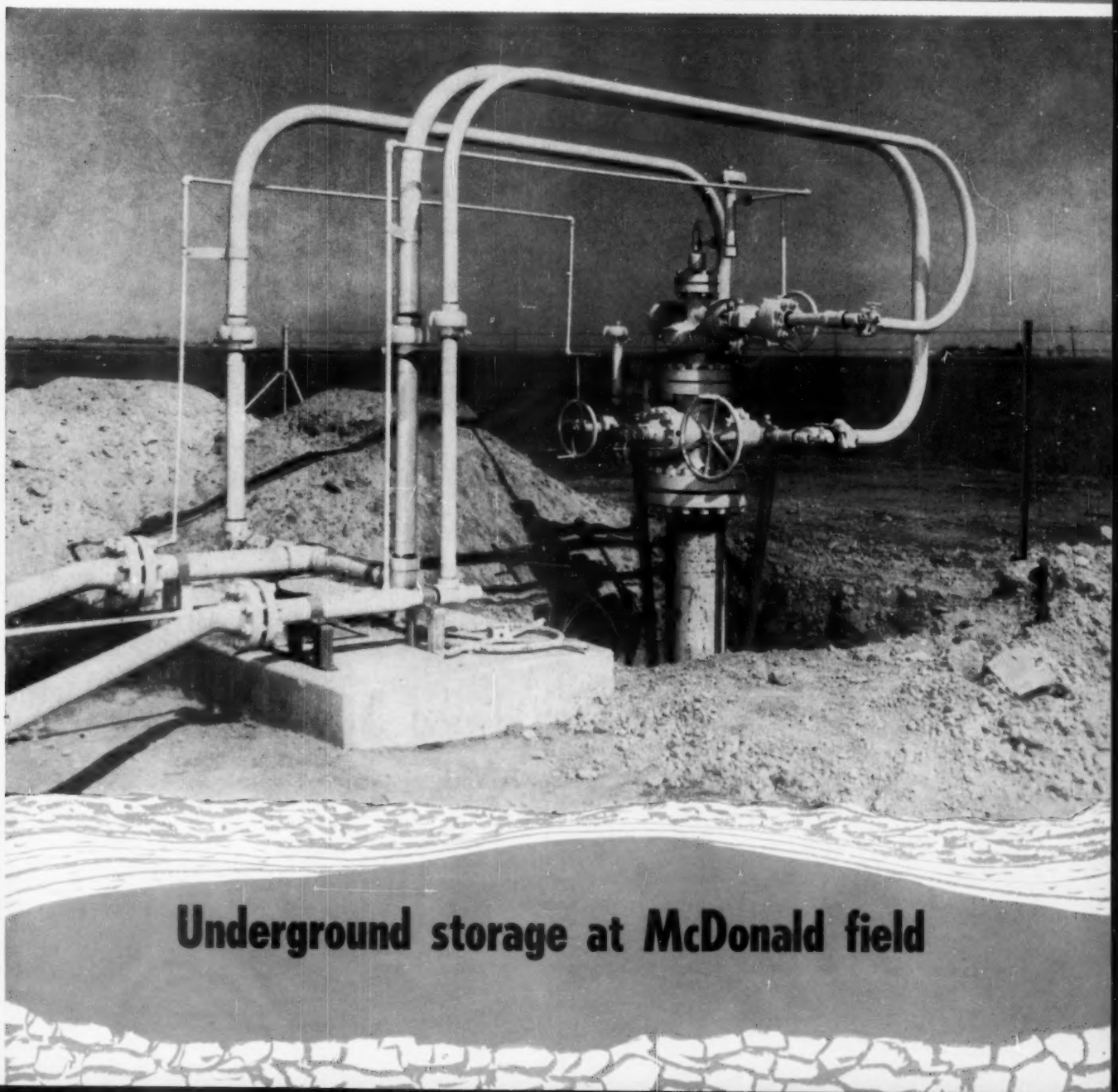
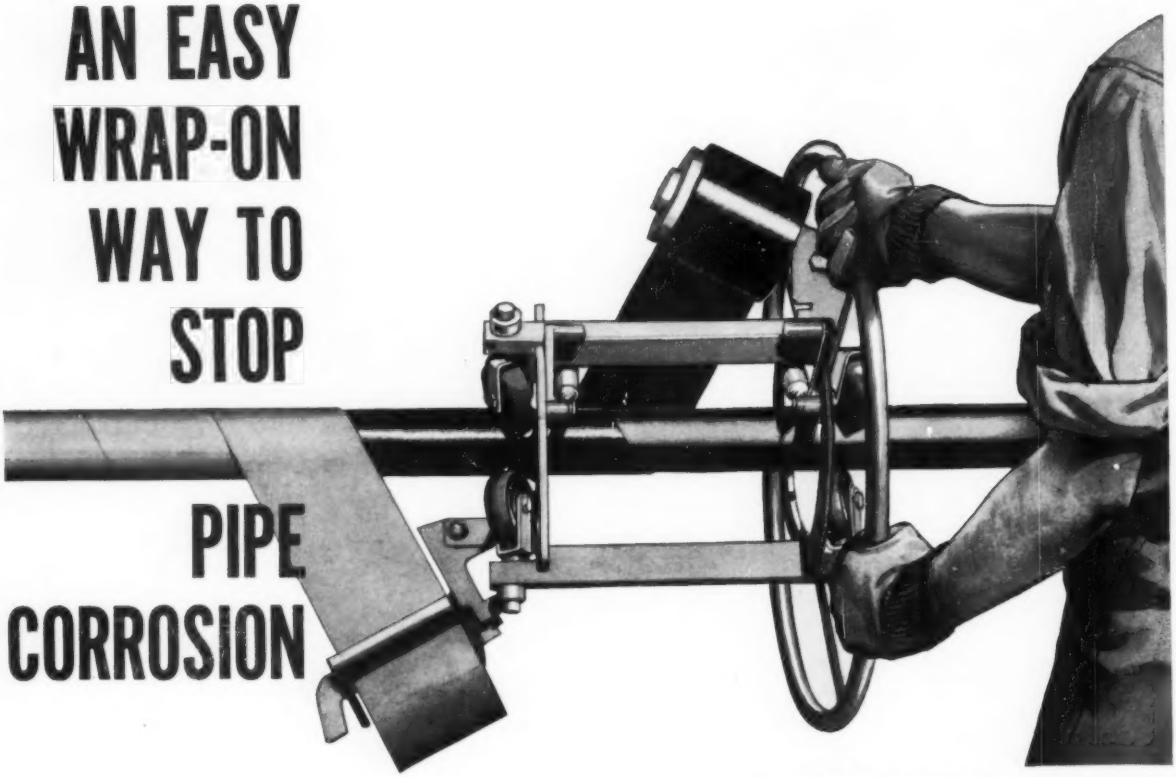


Underground storage at McDonald field

AN EASY WRAP-ON WAY TO STOP PIPE CORROSION



The new CORR-PREV Pipe Coating Team comes in easy to handle tape form. It goes on pipe faster and lasts longer than corrosion-proof paints. It's cleaner and simpler to apply, too, than hot tar coats. And most important, this new CORR-PREV Team offers all the cost-cutting, pipe-saving advantages of *polyethylene* tape.

With CHASEWRAP Abrasion-Resistant Overwrap and Chasekote polyethylene tape, you get the easiest and best pipe protection at *lowest applied cost!* There's no heating, drying, clean-up or shut-down time. Each roll is factory-uniform in thickness and quality. And all coating materials — including rental of high-speed applicators — are available from one reliable source. Want samples? Specs? Prices? Write **CHASE & SONS, INC., 26 Spruce St., North Quincy, Mass.**

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Pressure-Sensitive Polyethylene Tape has an extra-heavy adhesive mass that clings to clean pipe on contact . . . makes a perfect, permanent bond that rustproofs, waterproofs and insulates pipe against all types of corrosion.

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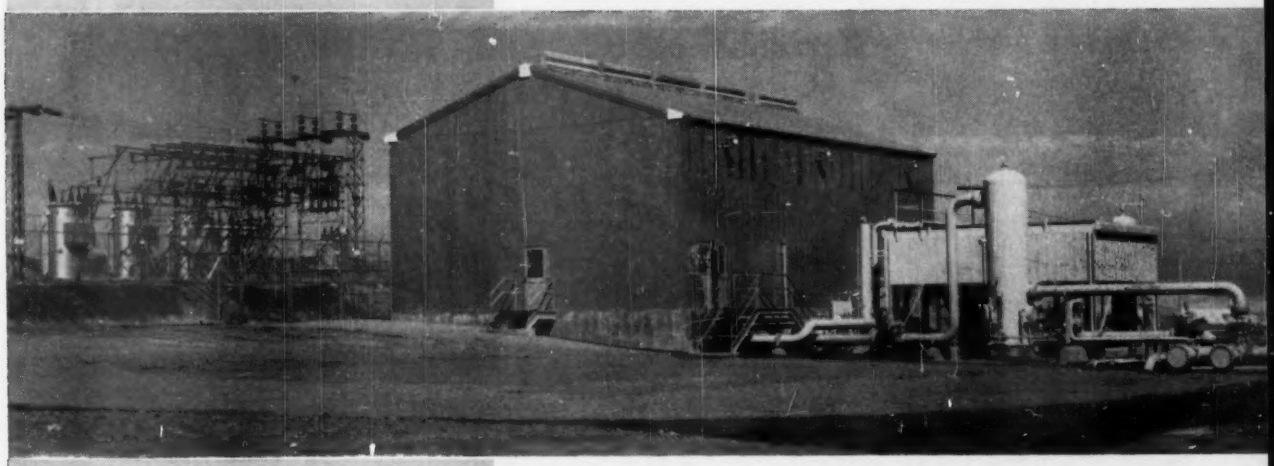


Fig. 1. Brentwood compressor station

Underground storage at McDonald field

By JARROLD M. KUNZ
Registered Professional Engineer
Pacific Gas & Electric Co., San Francisco

GAS exclusive

PACIFIC GAS & ELECTRIC CO., in distributing natural gas to most of the northern two-thirds of the state of California, has encountered seasonal peaking problems similar to those of other gas utilities across the country. In fact, the total residential sendout for the three coldest winter months is usually about three times that for the warmest three summer months, and the peak winter day sendout is about five times that for the average summer day.

Moreover, as California becomes increasingly dependent upon out-of-state gas, the problem of seasonal peaking becomes more and more important. This is because the high fixed capital costs of long transmission pipelines require that they be operated almost at full capacity on a year-round basis. Consequently, the company has taken steps to supplement its winter gas supply rates by methods other than increasing the capacity of its transmission pipelines. One such method has been the development of underground storage reservoirs.[1]

In December 1958, PG&E completed arrangements for the purchase of rights to a nearly depleted dry-gas-producing formation located in the delta area of the Sacramento and San Joaquin rivers, about 50 miles east of San Francisco. When it is fully developed, this gas field, known as the McDonald Island storage field, will provide an in-and-out yearly storage of some 30 billion cu ft. Having an estimated original gas volume of 178 billion cu ft, it is probably

[1] This use for underground storage reservoirs has grown rapidly in recent years. The American Gas Association's ninth annual report on statistics of underground gas storage in the United States, December 1959, reports that 55 gas companies in 20 states were operating 209 underground storage projects containing an estimated 879 billion cu ft of working gas.

the largest producing field to be converted to storage, although several other storage fields have a larger working capacity than this one will initially. Storage of gas in the summer will be at an average rate of about 150 MMscfd and withdrawal in the winter at rates ranging from 150 to 400 MMscfd, depending on field pressure. Thirty-two wells and two compressor stations, with a total of 10,500 hp, are planned for the storage project. Total cost has been estimated at around $25 million including the purchase of storage rights and cushion gas.

The field, which was discovered in 1936, had produced a total of 148 billion cu ft before the production of gas was discontinued on March 16, 1958, in consideration of the pending purchase arrangements. By that time, the field had declined from its discovery pressure of 2086 psig to 450 psig. Since it was determined that 900 psig should be the minimum operating pressure of the storage zone to protect it from water encroachment and other possible formation damage, arrangements were made to put gas back into the wells from one of the company's transmission mains. At the same time, the design and construction of the Brentwood compressor station was initiated.

This compressor station (*Fig. 1*) is located near Brentwood, Calif. Although it is some 17 miles from the storage field, it is an ideal site for a compressor station, not only because it permits optimum utilization of the pipeline between Brentwood and the storage field through operation at its maximum working pressures, but also because three principal transmission pipelines come together there. By tying the compressor suction into the existing metering and exchange facilities for these mains, three separate supplies of gas can be selected for injection to storage. A 17-mile pipeline connects Brentwood to McDonald Island, where the second stage of compression is located.

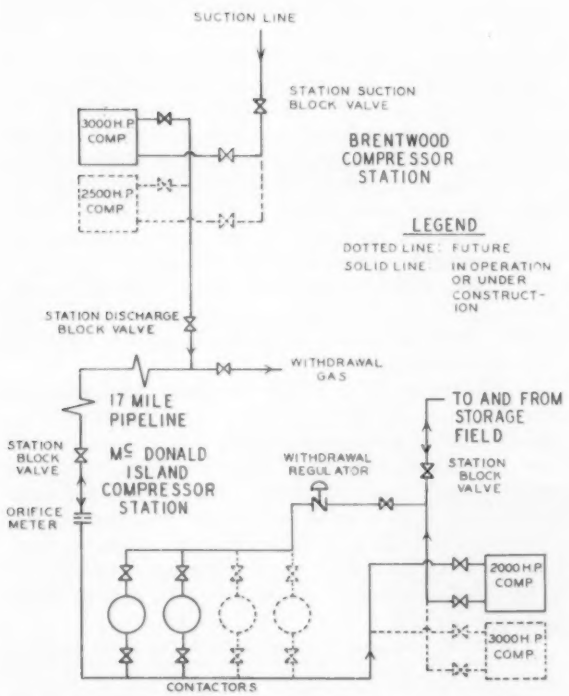


Fig. 2. Gas flow schematic of McDonald Island storage project.

The McDonald Island compressor station is near the center of the gathering system which connects the present wells to the terminus of the pipeline from Brentwood. It is also the site of regulation and dehydration equipment which prepares the gas for delivery to Brentwood on the withdrawal phase of the storage cycle. *Fig. 2* shows schematically how the compressor stations will route the gas to McDonald Island storage.

Some special considerations had to be taken into account in the design of the foundation for the major equipment at McDonald Island. The island is actually a reclaimed river bottom located in the two-river delta region. All year around it is surrounded entirely by water 10 feet above ground level, which is held back by a system of 16-ft high dikes. Continuous pumping is necessary to expel seepage and keep the water table at its present depth of approximately 5 ft below ground surface. In addition, due to erosion and soil compaction, the ground surface is subsiding at an average rate of 4½ in. per year.

A series of test borings and soil surveys, taken in the Spring of 1959, indicated that piling would be necessary for the heavier machinery. Consequently, the decision was made to mount all of the major equipment on a large 80-ft x 100-ft concrete platform, which would itself be supported by a system of 70-ft cast-in-place concrete piles. It later developed, however, that the platform could be conveniently elevated above ground level by supporting it on a system of 16-ft high columns which, in turn, would be mounted on the pile caps. This feature was especially appealing from the standpoint of operational security, because it would keep the equipment safely above the highest conceivable flood waters. Construction (*Fig. 3*) was started in December 1959, and finished in April of this year. The installation of the major equipment and piping was started immediately thereafter. The compressor station was scheduled for initial startup in November 1960.

The gathering system is the network of piping which connects the compressor station to the wells. A portion, installed originally for production, is still being used to serve the old and new wells in its vicinity. However, most of the new wells are not conveniently near to the old gathering system, so a con-

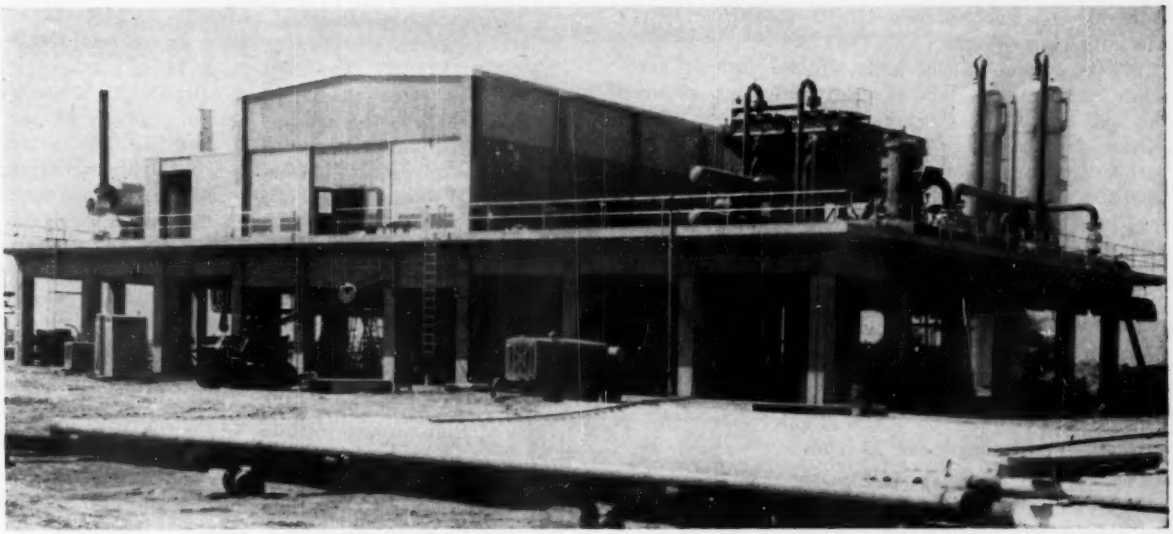
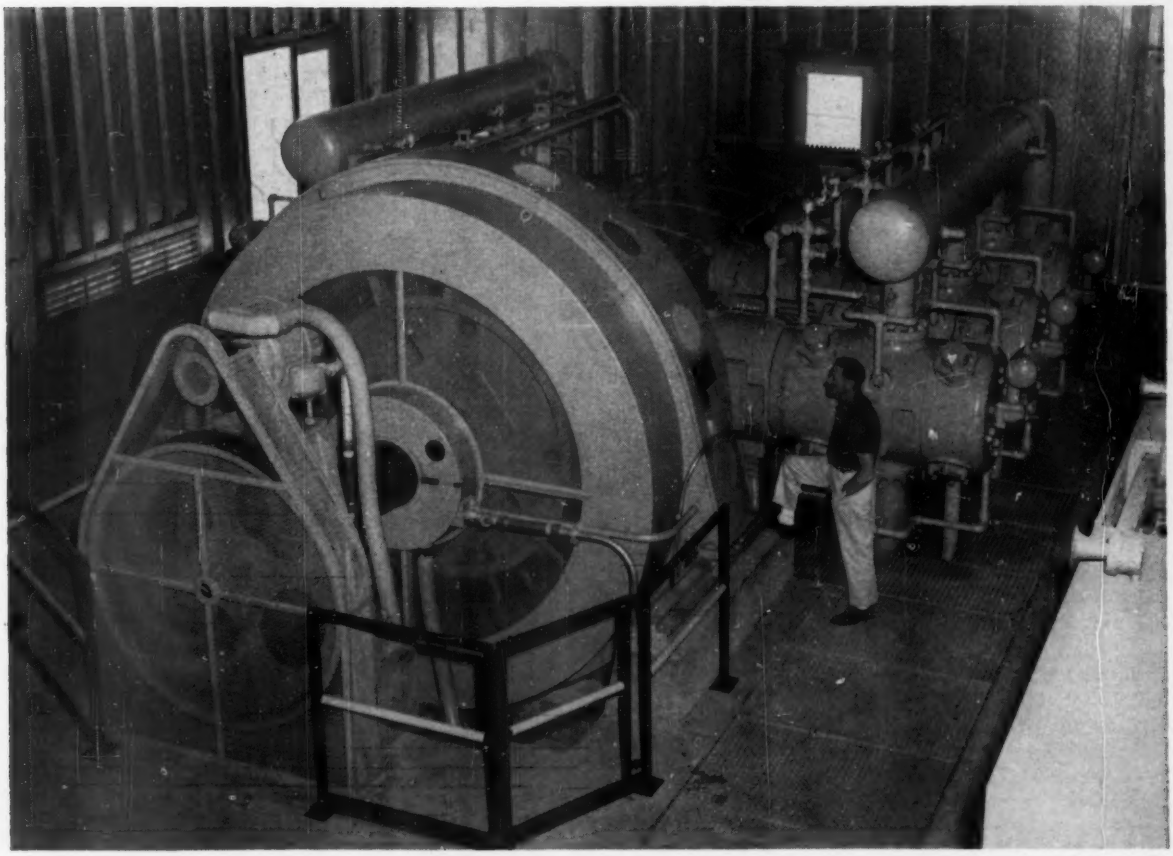


Fig. 3. Northwest view of platform at McDonald Island station.

Fig. 4. Brentwood's 3000-hp compressor.



siderable construction program is planned to enlarge the gathering system.

The operation of the wells will be entirely automatic. Operating on the pressure difference between the well and the gathering system, the well control valves automatically open for injection when the gathering system pressure builds up and automatically open for withdrawal when the gathering system pressure falls below the well pressure. They remain closed when there is no differential, that is, during periods of shut-in. Thus, it will be possible to switch from injection to withdrawal in a matter of minutes without any attention from field personnel. It is probable, however, that field personnel will be on hand for maintenance, safety, and the occasional adjustments required for the control system set points.

• Brentwood compressor station

The pipeline between Brentwood and McDonald Island determines the principal design criteria for the Brentwood compressor. Originally installed in 1950 exclusively for the transmission of native gas produced from McDonald Island wells, the portion nearest Brentwood has a maximum working pressure of 867 psig. Thus, the compressor discharge cannot exceed this value and the cylinders have been sized accordingly. However, the compressor and other gas equipment are rated at 1000 psig.

The compressor, designed to handle 75 MMscfd, is a 3000-hp, 6-cylinder electric motor-driven reciprocating unit (*Fig. 4*). The 10¾-in. x 14-in. stroke cylinders are sized primarily to handle a 350-psig suction, which is the average arrival pressure of gas from the company's transmission facilities. The motor is a constant-speed synchronous type. Volume control is achieved through clearance pockets and head and crank-end suction valve unloaders. The gas is scrubbed before and cooled after compression by an oil bath scrubber and a horizontal forced-draft air-cooled heat exchanger. This heat exchanger also contains a coil for the compressor cylinder cooling water, which in turn circulates through a shell and tube heat exchanger to cool the compressor lubricating oil.

After the main start or stop button is pushed, a series of timed relays initiates sequential startup and shutdown of the compressor and its auxiliaries. By a series of electrical self-checks, the compressor is prevented from starting unless all its auxiliaries are running properly. Moreover, should a mal-function occur in the compressor or any of its auxiliaries while the compressor is operating, a shutdown sequence is automatically initiated. In the compressor shutdown sequence, two electric motor-operated valves, which separate the suction and discharge lines from the headers, close automatically. After they have reached their closed position, a blowdown valve opens and

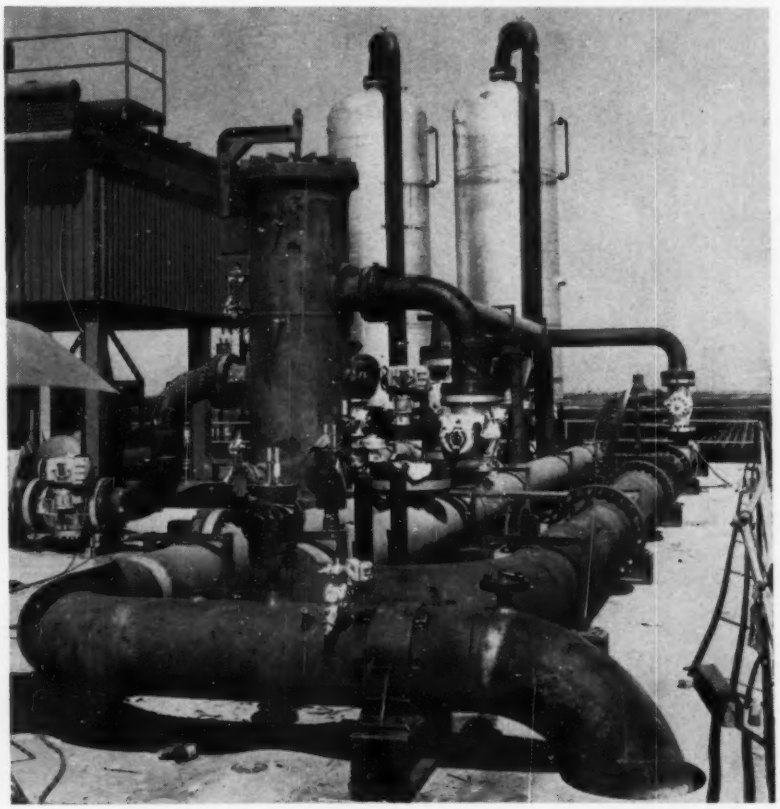


Fig. 5. Arrangement of headers at McDonald Island.

vents both lines to the compressor. In this way, the high pressure gas is kept out of the compressor building when the compressor is not operating. This shutdown sequence is normally initiated when the operator pushes the stop button. However, as indicated above, it is also initiated automatically by a series of 20 mal-functions relating to the operation of the compressor. Examples of these mal-functions are: Low compressor lube oil pressure, excessive vibration in the heat exchanger, high gas temperature downstream of the heat exchanger.

The station block valves on the main suction and discharge headers are pneumatically operated to insure their operation even in the event of a power failure. When they reach their closed positions, several blow-down valves open in order to vent all the piping within the area of the compressor station. The shutdown sequence which operates these valves is designated the "emergency shutdown," its purpose being to shutdown automatically the entire compressor station when mal-functions of a more serious nature occur. There are seven such mal-functions, examples of which are: Gas leak detection, low gas discharge pressure, and low air supply to the control system. In addition, several red pushbuttons labeled "emergency" are located around the compressor station for manual initiation of the emergency shutdown sequence.

Two annunciation panels, one indicating the emergency shutdown mal-functions, the other indicating the compressor shutdown mal-functions, are located on the main compressor station panelboard. Acknowledgment and reset are required before the equipment can be put back into operation. When the additional compressor is installed, each compressor will have its own annunciation panel, and a mal-function in one compressor will shut down that compressor only, leaving the other compressor free to operate. Of course, the emergency shutdown sequence will continue to shut down the entire compressor station.

A closed-loop electronic control system, operating through the compressor cylinder unloaders, maintains volume control. Transducers, located at the headers, convert the suction pressure, discharge pressure, and differential pressure across a suction flow orifice meter into 0-½ v signals. Each signal feeds an electronic set-point controller (the differential pressure signal is pressure-compensated for direct reading on a recording flow controller). Then a selector takes the output from the controller with the lowest output value and sends it to the compressor room, where a transducer converts it back to a 0-15-psig air signal. A pneumatic sequencing system, operating on the 0-15-psig signal, operates the cylinder unloaders.

Thus, the compressor is controlled entirely by means of a start button, a stop button, a suction pressure set-point, a discharge pressure set-point, and a flow set-point (calibrated in psig or MMscfd). Ordinarily, the flow controller operates the compressor, the pressure controllers serving mainly as standby devices to take over control should the discharge pressure rise above, or the suction pressure fall below, pre-set values. The operation of the compressor station is remote and unattended, the controls being located in a nearby building devoted primarily to metering and exchange of gas among the three mains. The operator stationed there starts, stops, and sets the compressor set-points as an incidental part of his duties. Ordinarily, he has no reason to enter the compressor station property. However, a maintenance man stops by once a day to check the compressor station equipment and, if needed, he is available on call at other times.

At the present time, the company is proceeding with the engineering necessary to install an additional 2500-hp compressor at Brentwood. The construction is tentatively scheduled for completion in 1961 to coincide with the completion of the company's Canadian pipeline project. This additional compressor will be designed primarily to handle Canadian gas and will raise the total injection storage rates to 150 MMscfd.

• Brentwood-McDonald Island pipeline

The 17-mile pipeline, which connects Brentwood to McDonald Island, is mostly 18-in. x 0.250-in. wall pipe. In order to conform with the ASA Code for gas transmission piping, the 10-mile section nearest Brentwood is rated at 867 psig (60 per cent of yield), while the remainder is rated at 1040 psig (72 per cent of yield). At most (high) flows the gas withdrawn from storage will enter the pipeline at about 1040 psig at McDonald Island and decline to less than 867 psig by the time it reaches the 10-mile section nearest Brentwood. However, as a safety measure, a pressure-limiting station is located about 10 miles from Brentwood to automatically limit the pressure of the Brentwood-bound gas to 867 psig.

The pipeline crosses four rivers between Brentwood and McDonald Island and reduces to 14-in. x 0.375-in. wall somastic-coated pipe at each of these crossings. Unfortunately, they account for a large part of the pressure drop between the two stations, and some day it may be necessary to parallel or replace them.

• McDonald Island compressor station

Fig. 5 shows the compactness of the arrangement of the piping and equipment, which is necessary to fit both compression and withdrawal facilities on the 80-ft x 100-ft platform described above. The station piping on the Brentwood side of the compressor is rated at 1200 psig; and the storage field side is rated at 2160 psig, the approximate discovery pressure of the storage formation. Heavy wall pipe, manufactured to specifications ASTM A-106 or A-53 Grade B seamless, is being used throughout, with wall thicknesses ranging up to 1.156 in. for the 18-in. discharge

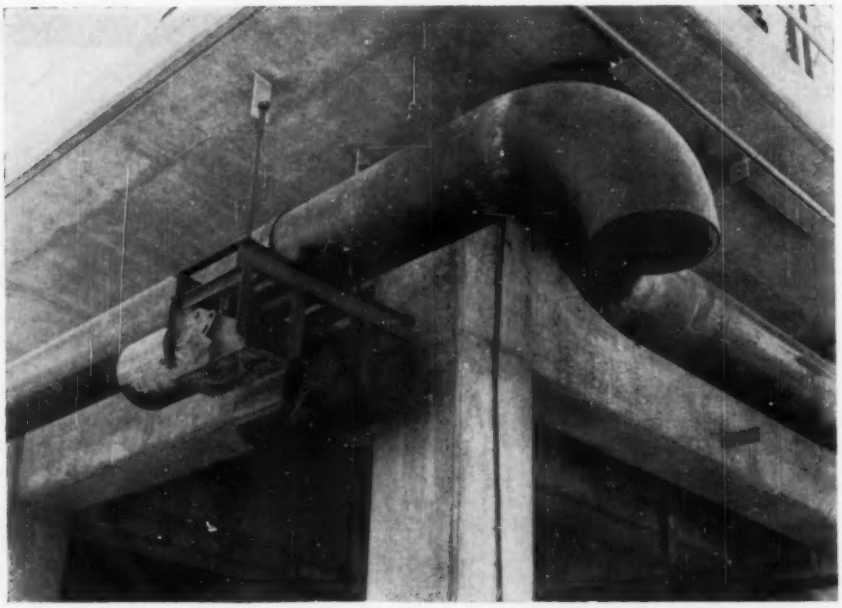


Fig. 6. Connecting pipe to storage field (18 in. OD x 1.165-in. wall).

header (*Fig. 6*). It takes a welder four hours and 20 passes to complete a weld on this pipe. Such heavy walls and large diameters make the extrusion process of forming branch connections especially attractive, for extrusions are cheaper than welding tees and are free from the stress concentrations usually associated with reinforced welded nozzle connections. Moreover, a large number of welds can be eliminated from a header by extruding several branch connections out of a single piece of heavy wall pipe. A hot extrusion process was used to shop-fabricate 12 spools of the platform piping, each of which contained several extruded connections. *Figs. 7 and 8* show 12-in. contactor connections extruded from a 20-in. header. Note the full-sized 20-in. x 20-in. extrusion in *Fig. 8*.

The compressor, designed to handle 75 MMscfd, is a 6-cylinder reciprocating electric motor-driven unit (*Fig. 9*). The motor is rated at 2000 hp, nominal, with a 115 per cent service factor. The 8¼-in. x 14-in. cylinders are sized primarily to operate with a 700-800 psig suction (from Brentwood) and a 900-2100 discharge (to the storage field). Such a large variation in the discharge pressure has made clearance pockets desirable in order to bring the horsepower per cylinder down at the higher discharge pressures. Thus each cylinder has two clearance pockets, one in the head-end and the other in the crank-end valve. All clearance pockets are pneumatically operated in order to facilitate remote and automatic control. Here, as at Brentwood, the constant-speed synchronous motor makes pneumatic unloaders necessary on all suction valves in order to provide volume control. *Fig. 10* shows the cylinders with the pneumatic unloaders (top) and the pneumatically operated clearance pockets (end and bottom). Space has been left in the compressor room to accommodate a second compressor. (Note the pit in the foreground of *Fig. 9*.) Tentatively scheduled for installation in 1961, it will probably be an 8-cylinder, 3000-hp unit designed to go along with the increased compressor capacity scheduled for installation that same year at Brentwood.

A dry-type fiberglass filter-separator (*Fig. 5*, center) cleans the gas before compression and a forced-draft air-cooled heat exchanger (*Fig. 11*) cools it after compression. A water coil included in the heat exchanger provides cooling for the compressor cylinders and the lubricating oil. The layout of this equipment is a unitized arrangement with space provided on the platform for another cooler and filter to go along with the second compressor.

On the withdrawal phase of the storage field operation, the same header which served the compressor discharge on injection to storage will feed the regulators for withdrawal. These two regulators, sized to handle 200 MMscfd, will cut the field pressure down to about 1000 psig before the gas is transmitted to Brentwood. Space has been provided in the layout to accommodate one more regulator which, when installed, will handle the withdrawal rates up to 400 MMscfd.

All gas withdrawn from the storage field will be dehydrated before it enters the pipeline to Brentwood. Accordingly, two tri-ethylene glycol contactors (*Fig. 5*, rear center), each designed to handle 100 MMscfd, are installed downstream of the regulators. These vessels, 26 ft high and 83 in. in diameter, are rated at 1200 psig and have nominal wall thickness of 3 in. Each weighs 37 tons. A glycol reboiler (*Fig. 12*, center) boils off the water from the glycol-water mixture as it comes from the bottom of the contactor. Then

four circulating pumps return the water-lean glycol to the top of the contactors for completion of the cycle. Space has been provided on the platform to accommodate two additional contactors and an additional reboiler when the withdrawal rate is increased to 400 MMscfd.

As the gas leaves the contactors it enters the same 20-in. header which serves the compressor suction on the injection phase. A two-way 20-in. orifice meter, located on this header, meters the gas on both the withdrawal and injection phases. The header and orifice meter are shown on the right of *Fig. 5*.

A 5000-kva substation (*Fig. 12*) is also located on the platform providing a 60,000- to 4160-v stepdown for the compressor motor power. A 4160-120/208-v transformer provides all other power requirements.

Inasmuch as the operation of both the injection and withdrawal facilities is to be automatic or remotely controlled from Brentwood, an extensive communication and control system has been developed. A two-way microwave circuit between the two stations will carry the following information and control functions:

McDonald Island to Brentwood

1. Telemeter suction pressure, discharge pressure, compressor horsepower, and gas flow in either direction.

2. Status indication for 80 off-on functions, such as pockets (opened or closed), cylinder unloaders (loaded or unloaded), valve positions (opened or closed), trouble-annunciation.

3. Two voice channels for telephone communications.

Brentwood to McDonald Island

1. Telemeter suction pressure controller set-point, injection flow controller set-point.

2. Off-on control switching for 40 off-on functions such as open and close cylinder pocket, load and unload cylinder valve, start and stop compressor, start and stop withdrawal operation.

3. Two voice channels.

A panel board located at Brentwood will enable the operator to remotely control the McDonald Island compressor either manually or automatically. If his choice is manual operation, he can use a separate off-on push button assigned to each pocket and each unloader. If his choice is automatic operation, he need only set the suction pressure and flow set points; an electronic closed-loop control system, similar to the one at Brentwood, is located at McDonald Island and will use these telemetered set points to operate the pockets and unloaders automatically. In either case, a start and stop button is provided on the Brentwood panel board to initiate remotely the startup and shutdown sequences for the compressor and its auxiliaries.

Similarly, a start and stop button is located at Brentwood to control the withdrawal of gas from storage. The withdrawal control simply opens a valve to supply gas to the regulators, whose opening strokes are automatically retarded to bring the dehydration units gradually on the line. During the withdrawal phase, the compressor is automatically locked out and prevented from operating; during the injection phase, the withdrawal facilities are automatically locked out and prevented from operating. The control system is designed so that it may be conveniently expanded to accommodate the additional compressor, regulator, and dehydrators mentioned above.

Annunciation and automatic shutdown sequences similar to those at Brentwood are also being installed at McDonald Island. However, for the sake of reliability, the control and shutdown systems will be powered by batteries so that they can function even in the event of a power failure. Moreover, in order

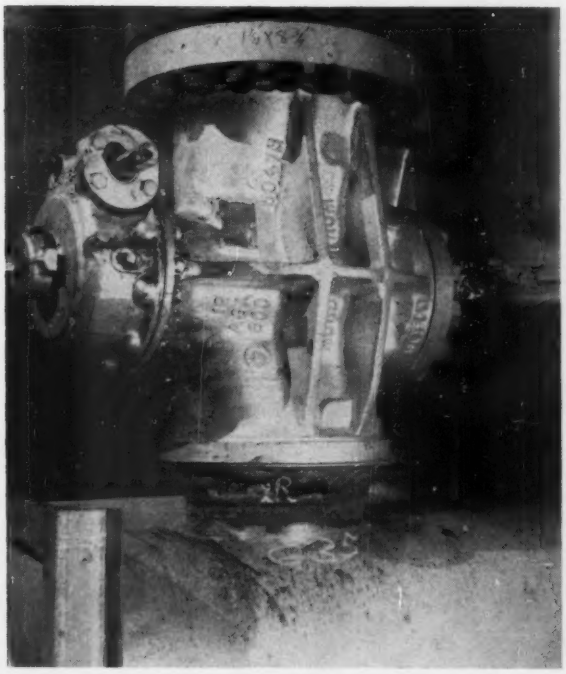


Fig. 7 (left). The 20-in. x 12-in. branch extrusion to contactor.

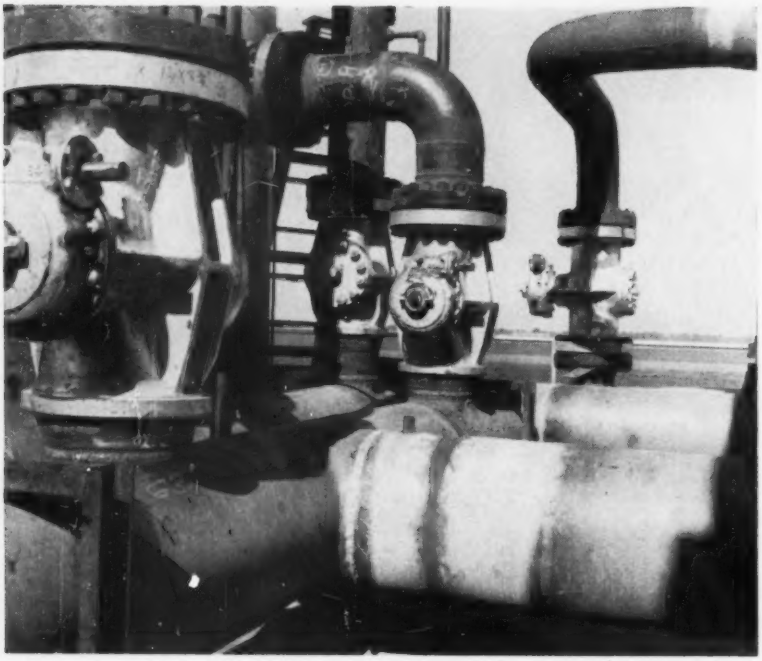


Fig. 8. Twenty-inch extruded pipe spools.

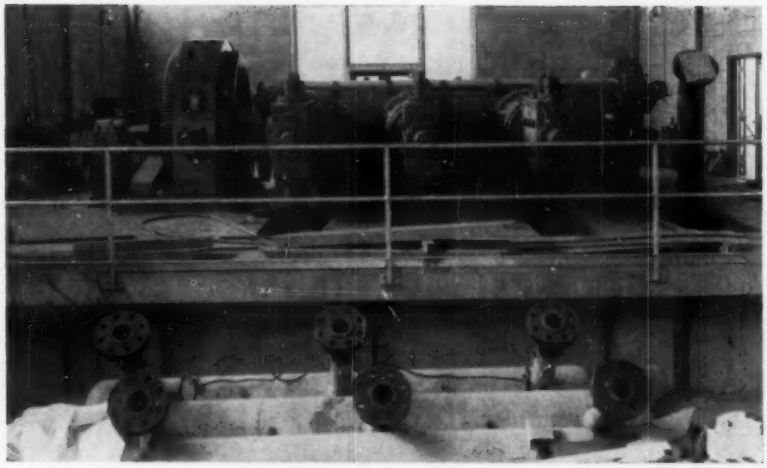


Fig. 9. McDonald Island's 2000-hp compressor.

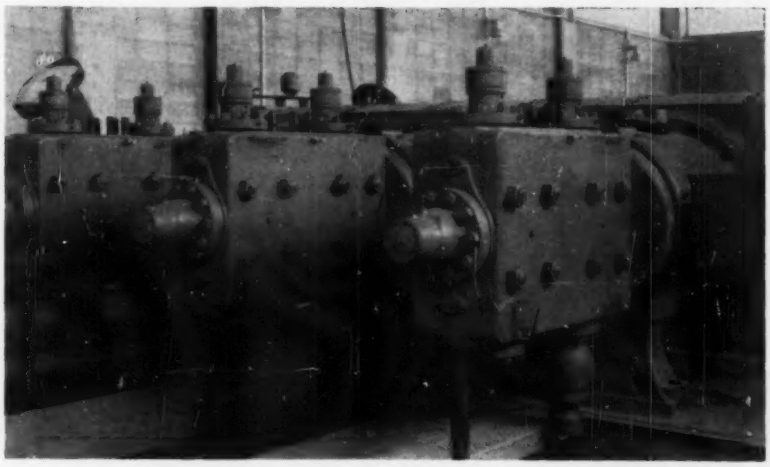


Fig. 10. McDonald Island's 2500 psig, 8¼-in. x 14-in. cylinders.

to make sure that the withdrawal operation can proceed even under such adverse circumstances as a flood and power failure, a gas engine-driven standby generator is being installed on the platform which will automatically start up and supply power to operate the motor-operated valves and the communications equipment.

The main off-platform gas piping located near the compressor station must be connected to the piping on the platform in a special way because it will probably move downward as the soil gradually subsides. Since the connecting piping is 18-in. OD on both the Brentwood and the storage field sides of the platform, considerable flexibility must be built into it in order to allow for the differential settlement, which may be as much as 4½ in. per year. *Fig. 13* shows how this will be accomplished. An 80-ft side of the platform is used to suspend the pipe which connects the Brentwood pipeline, and a 40-ft side of the platform is used to suspend the pipe which connects the gathering system. The special pipe hangers, visible in the picture, are designed to resist a force equal to the weight of the pipe but to yield to any further downward pull. (See also *Fig. 6.*) Thus the pipe is allowed to flex downward as a beam cantilevered from the end which is anchored to the platform, and the downward movement of the other end is taken up proportionately along its length. The stresses in the pipe develop uniformly along its length, and the flexibility of the entire pipe is used to adjust to the differential movement. A record will be kept of the movement of both pipes. When the movement of either indicates that the stresses have reached a maximum permissible value, a vertical section will be cut and a pup, long enough to minimize the stresses, will be added.

- **Gathering system**

The lengths and sizes of the new pipe which will be installed in the gathering system are: 700 ft of 4-in., 6625 ft of 6-in., 6200 ft of 8-in., 7975 ft of 10-in., and 2900 ft of 12-in. The specifications are: 4½-in. OD x 0.237-in. wall, API 5L Grade B Seamless; 6⅝-in. OD x 0.375-in. wall, API 5L Grade B Seamless; 8⅝-in. OD x 0.500-in. wall, API 5L Grade B Seamless; 10¾-in. OD x 0.500-in. wall, API 5LX Grade X-42 Seamless; 12¾-in. OD x 0.500-in. wall, API 5LX Grade X-46 Seamless. Both old and new pipe are rated at 60 per cent of yield or better, the system being designed for 2160 psig. The new pipe will be double-wrapped with 160 deg F softening point asphalt felt over a fiberglass inner wrap. The entire gathering system will be provided with cathodic protection and

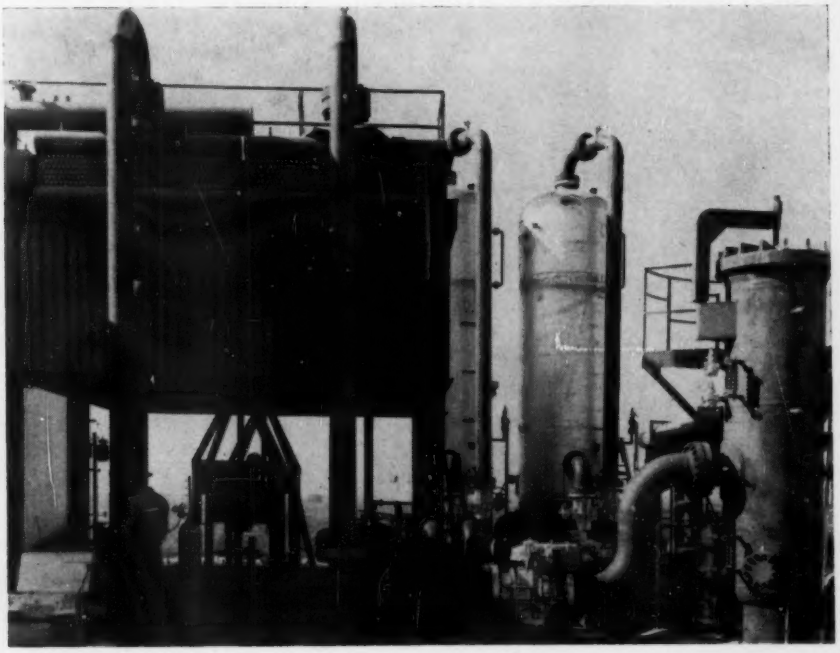


Fig. 11. Forced draft heat exchanger.

will be insulated from the compressor station and wells.

• Wellhead control

A schematic drawing of the wellhead piping is shown in *Fig. 14*. A main block valve isolates the well from the gathering system. A 4-in. orifice meter is used for metering and control of the gas injected or withdrawn from the well. A two-way separator (see also *Fig. 15*), rated 15 MMscfd at 1500 psig, removes liquids and solids from the gas stream. Diaphragm-operated control valves are used, one controlling flow to and from the casing, the other controlling flow to and from the tubing. At the Christmas tree (*Fig. 16*) a pressure-operated safety shut-off valve is provided on each of the casing and tubing flow lines. Manual casing and tubing shut-off valves permit isolation of the well at the Christmas tree.

A fully automatic control system operates this equipment in the following manner: A differential pressure controller, operating on the difference in pressure between the well and the gathering system, opens the control valves (for injection) when the pressure in the gathering system rises above the pressure at the well. A dual-type controller, it also opens the control valves (for withdrawal) when the pressure in the gathering system falls below the pressure at the well. The control valves remain closed in the intermediate pressure interval. Thus gas is injected into storage simply by starting the compressor. That is, the gathering system pressure begins to build up and, as it rises above the well pressure, the control valves automatically open. The field is shut-in by stopping the compressor: The gathering system pressure equalizes with the well pressures and the control valves close.

Similarly, the gas is withdrawn from storage simply by taking gas from the gathering system. That is, the gathering system pressure begins to drop and, as it falls below the well pressure, the control valves open. The field is shut-in by stopping gas withdrawal from the gathering system: The gathering system pressure equalizes with the well pressure, and the control valves close. The set pressures for the operation of the control valves will vary slightly from well to well (depending on location in the gathering system) in order that each of the wells will open and close in a pre-set sequence.

An additional dual controller is used at each well to limit its maximum injection or withdrawal flow. Operating on the flow across the orifice meter, it overrides the differential pressure controller mentioned above and starts to close the control valves when the flow reaches a pre-set maximum. This control feature is necessary to prevent excessive velocities at the well bottom which might damage both the well equipment and the surrounding formation.

The safety shut-off valves located at the Christmas tree are designed to prevent a serious loss of

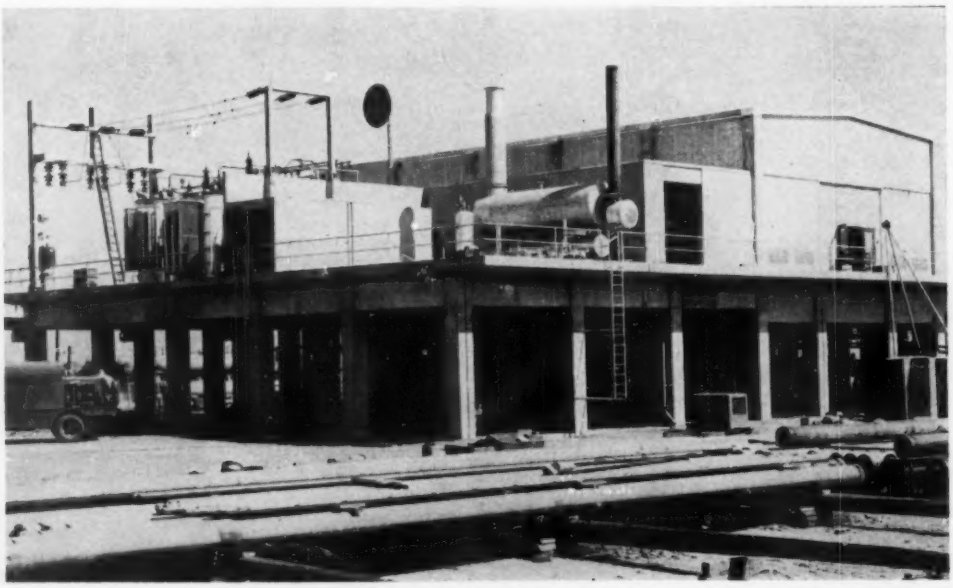
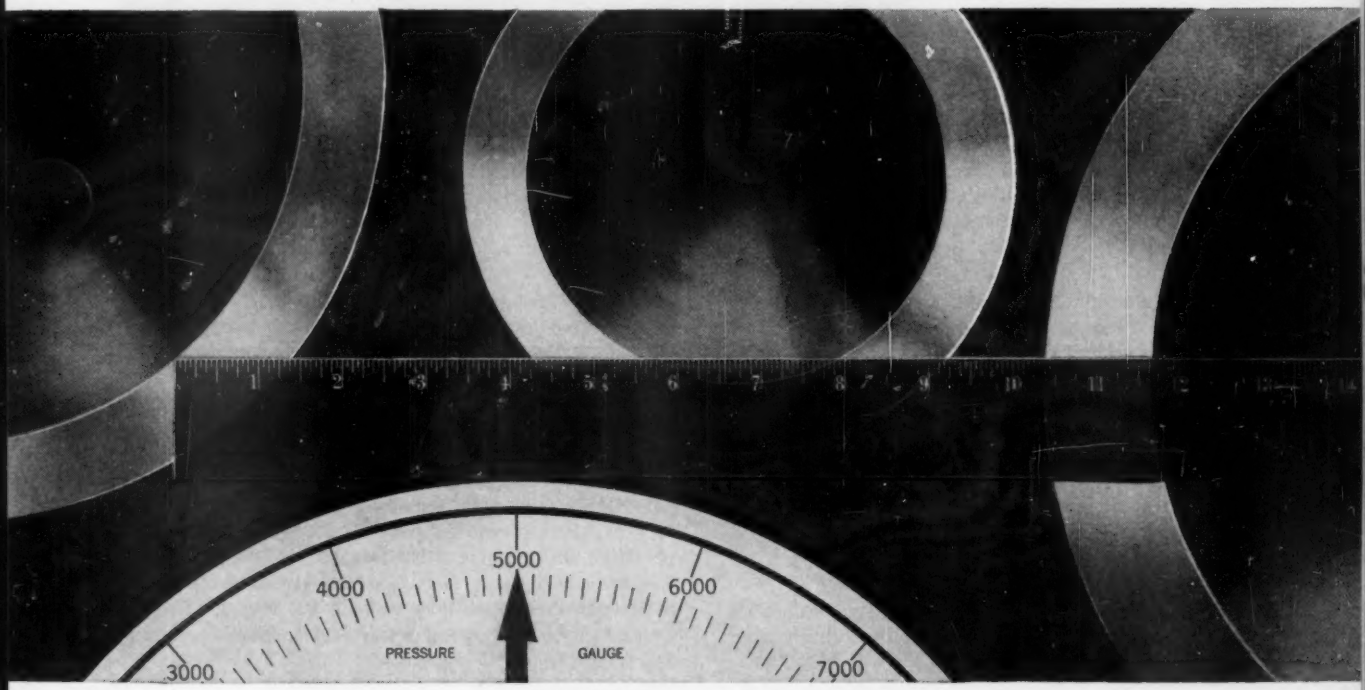


Fig. 12. Substation and reboiler.

It takes cannon-barrel pipe to store gas at 5,000 psi

This mark tells you a product is made of modern, dependable Steel.

North of the Susquehanna River near Renovo, Pennsylvania, is a depleted gas reservoir known as Leidy Field. It has just been converted into an underground gas storage field. The field has a total of 85 wells and is roughly 13 miles long and 7 miles wide.



To store gas in this natural reservoir when completed requires an injection pressure of 5,000 psi at the wellhead. This storage field provides for a peak withdrawal of 800 million cubic feet each day and an average withdrawal of 400 million cubic feet per day during the winter season.

Seamless Steel Line Pipe was selected for this project, because the high pressures demanded strong, reliable pipe with almost cannon-barrel thickness. Pipe walls ranged up to 1.312" in thickness in pipe size 6⅝-inch to 12¾-inch.

USS National Seamless Steel Line Pipe met these requirements. It is ideal for lines that handle gas, liquids and solids. It's available in a complete range of wall thicknesses, steel analyses, and in diameters up to 26 inches—USS National Electric-Weld Line Pipe up to 36 inches. Write for information on our products, services and facilities. National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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Fig. 13. Support for 18-in. connecting pipe.

storage gas in case a break should occur in the gathering system. Pressure-operated, they snap shut if the gathering system pressure falls to a pre-set point low enough to indicate a probable rupture. As a safety feature against the flooding which would occur if the levee should fail, all of the wellhead equipment, including the valves, controllers, and other instrumentation is designed to operate under a 20-ft head of water. A special water-tight controller case has been developed which has a 20-ft high breather vent.

• Storage formation

Electric log correlations have indicated that the storage formation is a faulted anticline lying about one mile below ground surface. The top of the dome is estimated at minus 5150 ft and the initial water table is estimated at minus 5315 ft. A projection of the estimated initial water-gas contact area indicates that the storage area originally covered approximately 1600 acres and contained some 81,000 acre-ft of gas sand. The sand is considered to be of relatively good permeability and porosity. It is presently planned to operate the field with a cushion of 900 psig. Although this cushion pressure figure is used because it will permit a more efficient use of the McDonald Island-Brentwood pipeline, it is also the pressure which, it is estimated, is necessary to keep the storage formation intact by preventing water encroachment or other

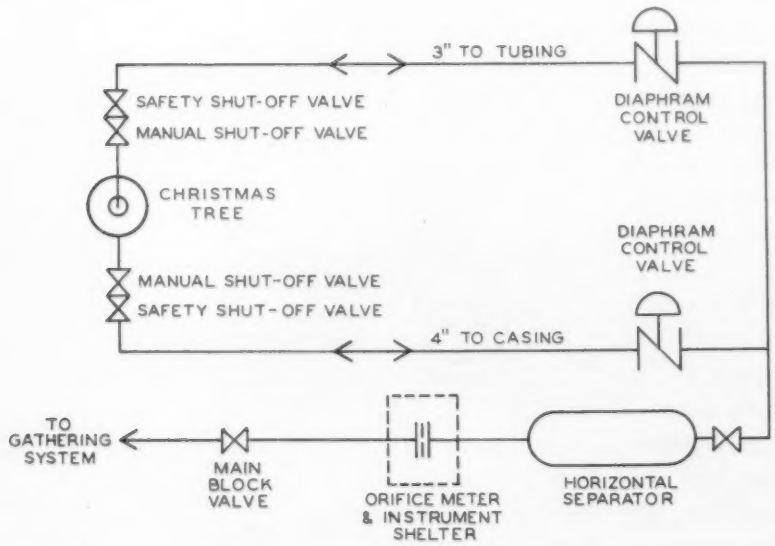


Fig. 14. Wellhead control schematic.

irreversible formation changes. This means that approximately 54 billion cu ft of gas must remain permanently in the formation.

It is expected that it will be necessary to operate the storage reservoir between the pressures of 900 and 1500 psig in order to store the required 30 billion cu ft of gas. It is possible to store more gas by operating at higher pressures, but to utilize more storage on an annual cycle would require more wells and greater injection and withdrawal rates than are presently planned. It will require 32 wells to deliver the 400 MMscfd which the present planning calls for. Of these, 21 are new wells and 11 are old wells. Some of the old wells are being repaired in order to bring them up to the standards of the new wells.

Because of the particular nature of the subsidence encountered at McDonald Island, it is expected that some unusual well maintenance problems will arise. In most cases where subsidence occurs over a producing formation, the surface subsidence is due to the downward movement of the formation itself. That is, the distance between the formation and the ground surface remains relatively constant, and the well structure moves downward evenly with the ground surface.

At McDonald Island, however, the surface subsidence cannot be related to a movement of the formation. Test borings have shown that the first 40 to 60 ft of soil is mostly peat, and it is thought that the 4½-in.-per-year subsidence mentioned above is due mainly to wind erosion and compaction of the layer of peat. This theory is borne out by the fact that the wellhead "rises" just about 4½ in. out of the ground each year, the position of the well structure remaining nearly constant relative to the stable formation.

Therefore, in order to keep the wellhead convenient for servicing, it will be necessary to import soil to fill in around the wellhead. This practice has been used on some of the older wells and has proven satisfactory. It is also to be expected that the gathering system, which is buried near the surface of the ground, will move downward from the wellhead an amount equal to the compaction of the peat layer. As a result, higher than usual stresses are expected to develop in the piping which connects the Christmas tree to the gathering system. Here excessive stresses will be avoided in two ways: First, the piping which connects the Christmas tree to the gathering system will have a long aboveground section so that the inherent flexibility of the pipe will allow it to adjust to the differential movements between its ends. Secondly, the connecting piping will be cut periodically and sections will be added to relieve the stresses.

In addition to the company's own engineering staff, the following groups deserve credit for their part in the storage project: The Guy T. Martin Co., Gardena, Calif., mechanical design for the Brentwood compressor station and electrical and mechanical design for the McDonald Island compressor station; Dames & Moore of Los Angeles, soil survey and foundation recommendations for the McDonald Island compressor station; and Stanley & Stolz of Los Angeles, consultants on the underground storage formation. ■

Fig. 15. Well control equipment.

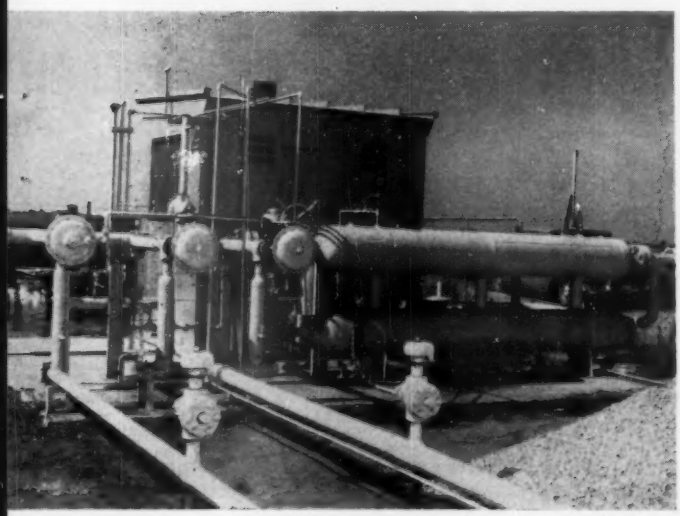
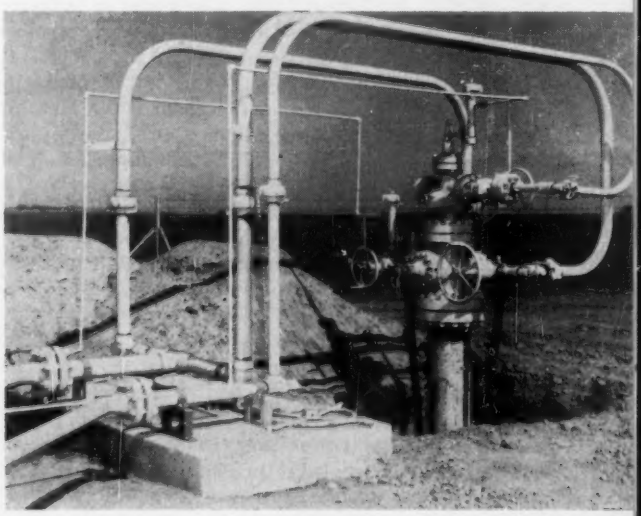
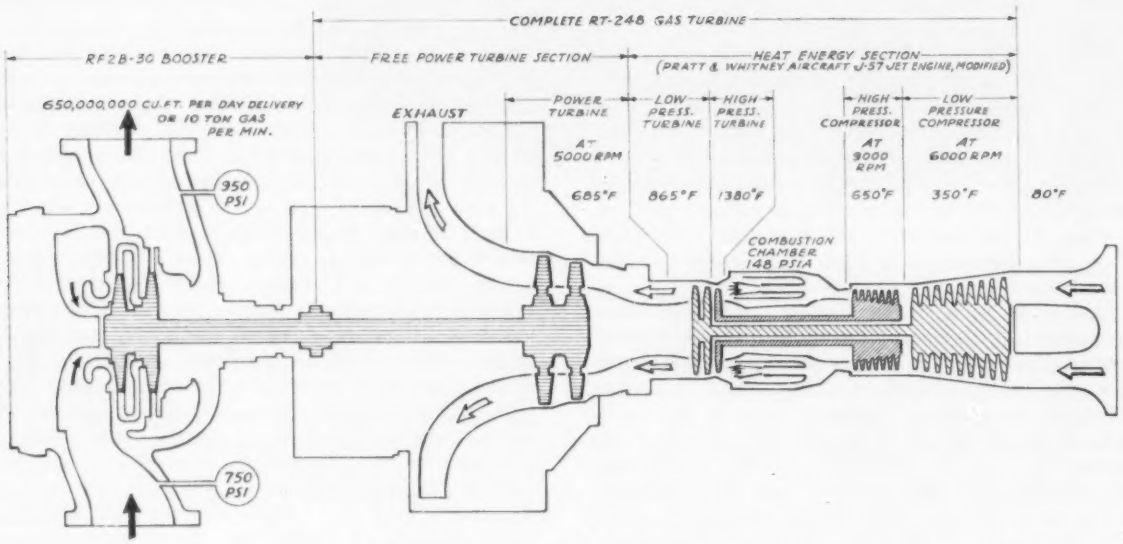


Fig. 16. Christmas tree at McDonald Island.



AIRCRAFT JET-ENGINE THRUST



Operating diagram of jet engine-power turbine.

harnessed for natural gas compression

INDUSTRY'S first harnessing of aircraft jet thrust as a source of stationary power began at Possum Trot (near Clementsville), Ky., on Nov. 15. It is significant that the introduction was made to industry utilizing one of the gas industry's major pipeline systems.

A new type of gas turbine, using an adapted aircraft jet engine, is now pumping about 600 MMcfd of natural gas in the pipeline compressor station of the Columbia Gulf Transmission Co., subsidiary of Columbia Gas System.

This represents the first successful mating of an aircraft jet engine to industrial power needs.

A revolutionary prime mover, the RT-248 gas turbine, develops 10,500 rotative hp and weighs 34,000 lb, about one-sixth the weight of a conventional gas turbine unit. It is the first of a family of jet-powered gas turbines to be rated from 350 to 15,000 hp. The powerplants are expected to find widespread use in the natural gas, petroleum and petrochemical industries, in electrical power generating and in marine applications.

Designed by Cooper-Bessemer Corp., Mount Vernon, Ohio, the new gas turbine uses as its heat energy source a Pratt & Whitney Aircraft J-57 jet engine, adapted to run on natural gas.

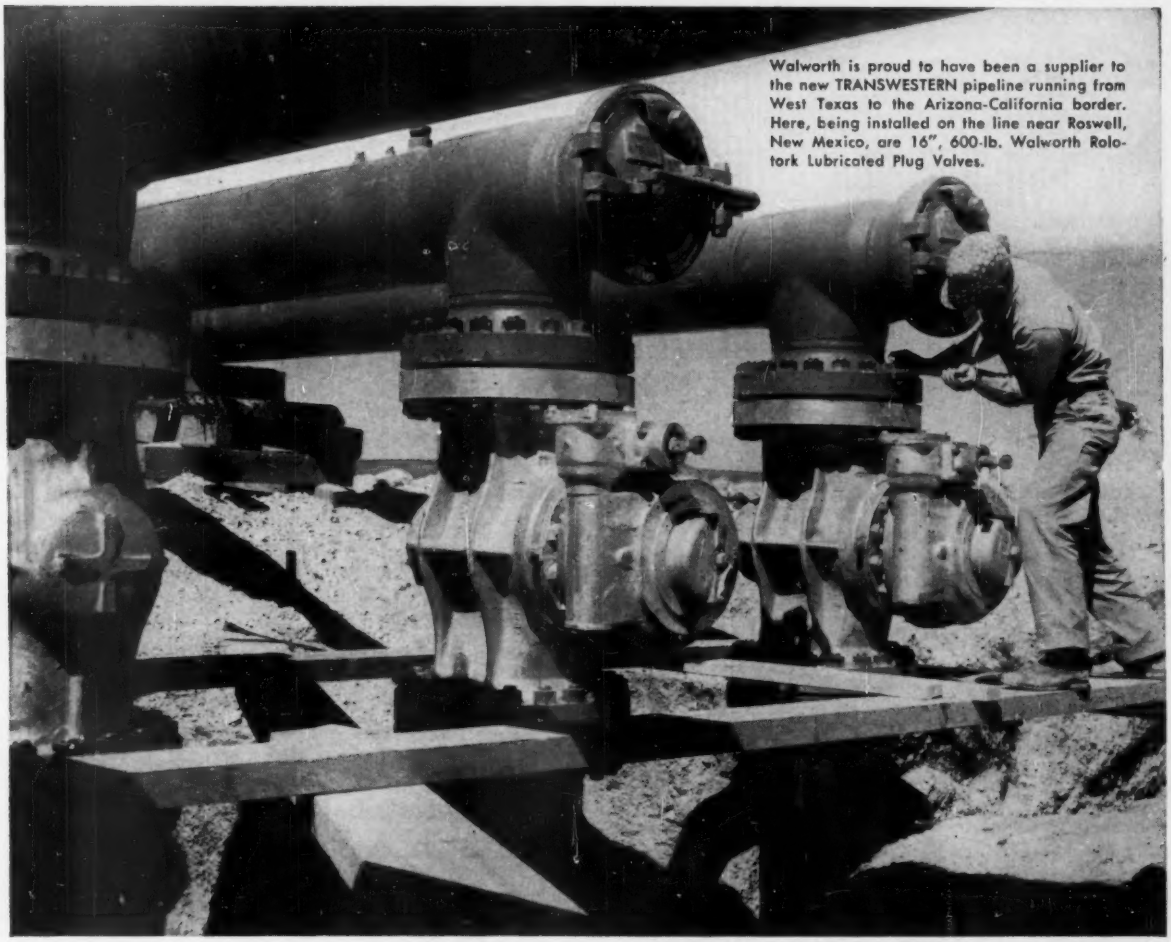
To Columbia Gas, the new power unit represents another step in its constant search to find ways to reduce costs and raise operating efficiency for the system's natural gas customers.

Almost 85 tons lighter than conventional gas turbines of equal power and efficiency, it is designed to substantially lower installation, maintenance, and operating costs.

Its light weight, 4000-lb jet engine section, with 10-to-1 compression ratio, requires no regenerating system. Nevertheless, thermal efficiency equals or exceeds that of all other gas turbines in operation today.

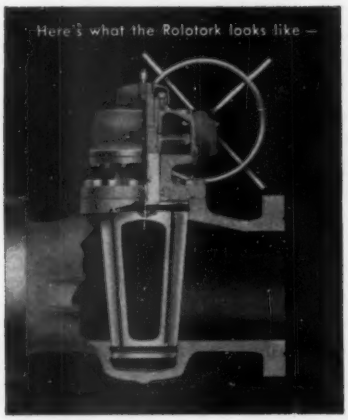
Regenerating systems circulate hot gases to salvage heat energy otherwise wasted, and are essential in conventional gas turbines to reach acceptable efficiency. They involve extensive equipment, components, and piping.

The RT-248 requires less than half the space, relatively simple foundationing and much lighter crane



Walworth is proud to have been a supplier to the new TRANSWESTERN pipeline running from West Texas to the Arizona-California border. Here, being installed on the line near Roswell, New Mexico, are 16", 600-lb. Walworth Rolotork Lubricated Plug Valves.

RELY ON *ROLOTORK* ...BY WALWORTH



No matter what the service, you can rely on the Walworth Rolotork Lubricated Plug Valve to operate easily and dependably in handling gas, crude or finished petroleum products. In service throughout the world, these valves have proved their complete dependability. Why? Because Walworth manufactures a *better* LPV.

The Rolotork turns more easily, closes tighter, and requires less maintenance. It can be lubricated without removing the lubricant fitting. The gear housing design permits simple attachment of lubrication and handwheel extensions without modifying the gearcase. And vertical and circumferential lubricant grooves completely frame the port openings, preventing leakage.

These are just some of the features that make Walworth LPV's better. For additional information, write Walworth Company, Lubricated Plug Valve Division, 3517 Polk Avenue, Houston 23, Texas.

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Jet engine-power turbine unit is housed in this new Columbia Gulf Transmission compressor station near Clementsville, Ky., completed in early November and put on-stream on the 15th of that month.

facilities than regenerated gas turbines of equal power. Thus, size and cost of a station building are greatly reduced.

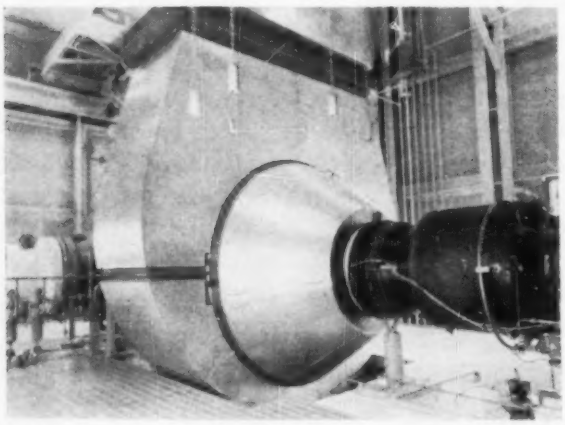
Less than four hours are required to remove the jet engine section and replace it, ready again for operation. Conventional systems require weeks of shutdown for overhaul.

The adapted J-57 jet engine never reaches jet "take off" speeds, temperatures, or stresses. In industrial application, it will operate at or below low stress flight cruising speed. Results are low running temperatures and prolonged service life.

Designers estimate the jet-section will run at least 8000 operating hours between overhaul, equivalent to a year's continuous operation.

Raw thrust of the J-57 jet section is converted to rotative power by a specially designed heavy-duty free turbine, completing a team that comprises the new RT-248 gas turbine. In this installation, the J-57 drives a Cooper-Bessemer centrifugal compressor which pushes natural gas through the Columbia Gulf pipeline.

Throughout industry, power loads have spiraled. Traditionally, power and size are directly related in engine development. The Cooper-Bessemer Corp. has long recognized that a new type of gas turbine might alter this relationship to advantage. Under the direction of Ralph L. Boyer, vice president and director of engineering, this became a major Cooper-Bessemer research effort.



Inside view of the compressor station showing the C-B RT-248 gas turbine and associated equipment.

The initial problem was to find a light but powerful heat energy source which would require no regenerating system to reach acceptable efficiency.

Millions of dollars and years of research time would have been needed to develop a new, lightweight heat energy source to fit this concept. Then Boyer came up with a seemingly simple yet radical idea:

Lightweight, powerful jet engines had been used for years to power aircraft. Why not use such a fully proven unit to provide the heat energy for a stationary gas turbine?

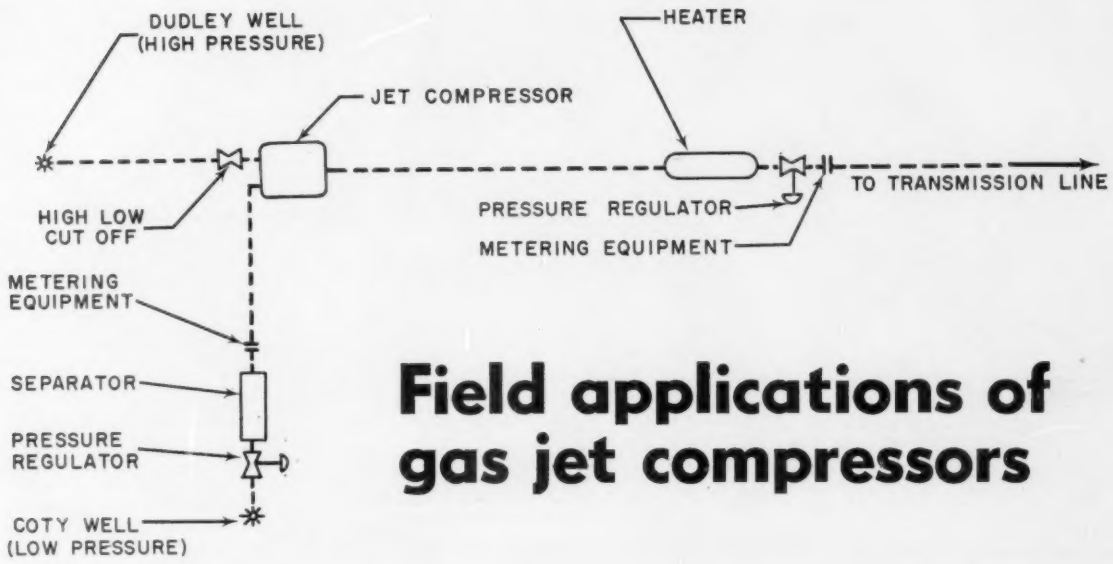
Cooper-Bessemer took this unique idea to Pratt & Whitney Aircraft, the world's leading manufacturer of jet engines. That company's J-57, which today powers most of our commercial jet liners as well as long range bombers, tankers and fighters, stood out as the most thoroughly tested, proven jet engine in existence. The J-57's 10-to-1 compression ratio offered unrivalled thermal efficiency. Based on its record, the J-57 was chosen as the ideal heat energy source for the new concept.

Cooper-Bessemer then successfully engineered a free power turbine to be linked to this heat energy source, resulting in the 10,500-hp RT-248 gas turbine.

Pratt & Whitney engineers adapted their J-57 to natural gas fueling. The RT-248 jet and free turbine sections were joined and fully tested in the Pratt & Whitney Aircraft Willgoos Laboratories in East Hartford, Conn., the world's largest privately owned turbine testing facility.

Only 14½ months has elapsed since Cooper-Bessemer and Pratt & Whitney made the first announcement of their engineering achievement on Sept. 1, 1959.

The Federal Power Commission granted permission for the installation of the RT-248 at Possum Trot in December 1959. Last May, ground was broken by Columbia Gulf for construction of the station building. The starting switch was thrown Nov. 15, 1960. ■



Field applications of gas jet compressors

By W. B. WOOD and L. A. FRITZ

Rio Grande Valley Gas Co., Brownsville, Texas

THE problem of compressing natural gas from a low-pressure to an intermediate pressure is frequently encountered by the gas producer supplying large transmission lines. In some gas fields, several sands of different pressures may be present, multi-completion wells may be made, or a number of single completed wells in different sands may be located relatively close together. In these instances, compressing the low-pressure gas to a sufficient pressure to supply transmission lines may be quite economical with the use of the gas jet compressor, if one of the wells or sands has sufficient pressure to be used as a motive gas.

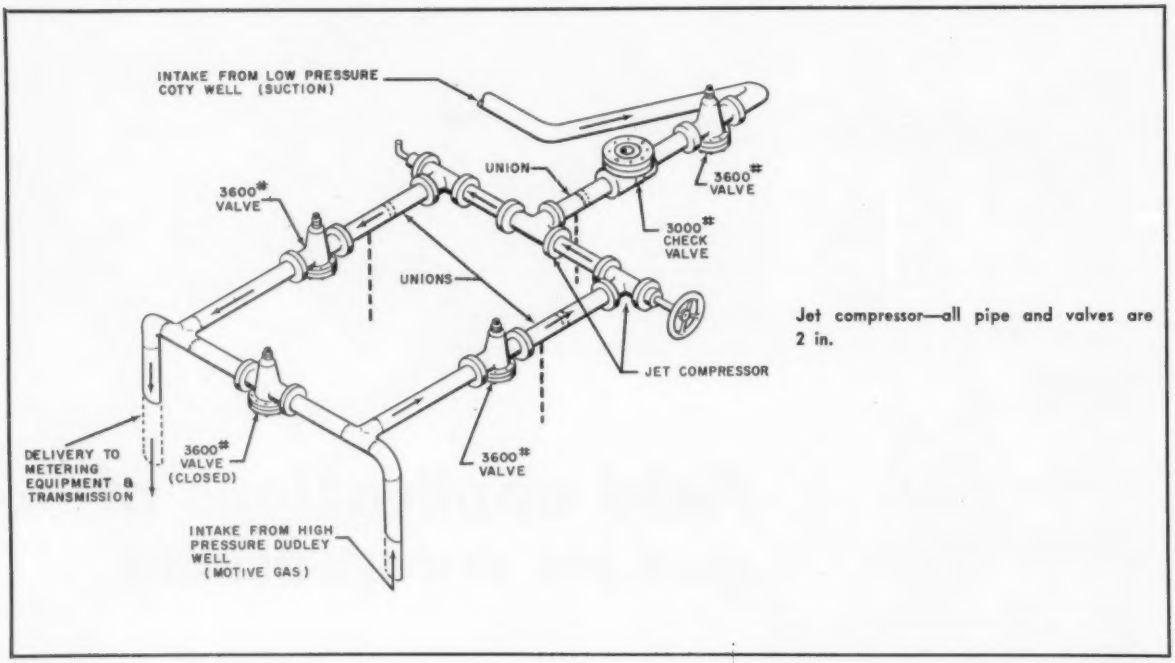
In the gas jet compressor a high pressure gas (motive gas) is expanded through a nozzle with a resulting velocity increase. And, as the gas passes through a restriction, gas at a lower pressure (suction gas) can be entrained. The velocity of the mixture of motive and suction gas is then reduced, which results in a pressure increase above the entrained suction gas pressure.

Where the pressures of motive and suction gas are relatively constant, the gas jet may be designed specifically to provide a desired discharge or delivery pressure to suit transmission line pressures and a desired suction gas flow rate.

In some applications of the gas jet on field installations a means of heating the motive gas may be required. When high-pressure gas is expanded in a nozzle, hydrate formation temperature may be encountered. If this is the case, an indirect heater may be required to heat the motive gas to a temperature sufficient to avoid hydrate formation at the nozzle. Where the gas jet can be installed near the well-head of the motive gas, the bottom hole temperature carry-over is usually sufficient to prevent solids from adhering and building up on the nozzle.

Our application of this compressor involved the testing of a low-pressure well for flow capability so that we could make a reasonable estimate of its value. The well to be tested was the American Rio Grande Land & Irrigation Co. Well No. 11, called the Coty. It was located about 3000 feet to the south of the J. N. Dudley Gas Unit Well No. 1, which was a high-

ABOVE: Jet compressor connection to field wells.



Jet compressor—all pipe and valves are 2 in.

volume well capable of serving as a motive gas source for the gas jet compressor.

We wanted to obtain a flow rate of 600 Mcfd from the Coty at flowing wellhead pressures of approximately 300 psig, and to compress this gas to 800 psig to permit us to deliver the gas into our transmission system.

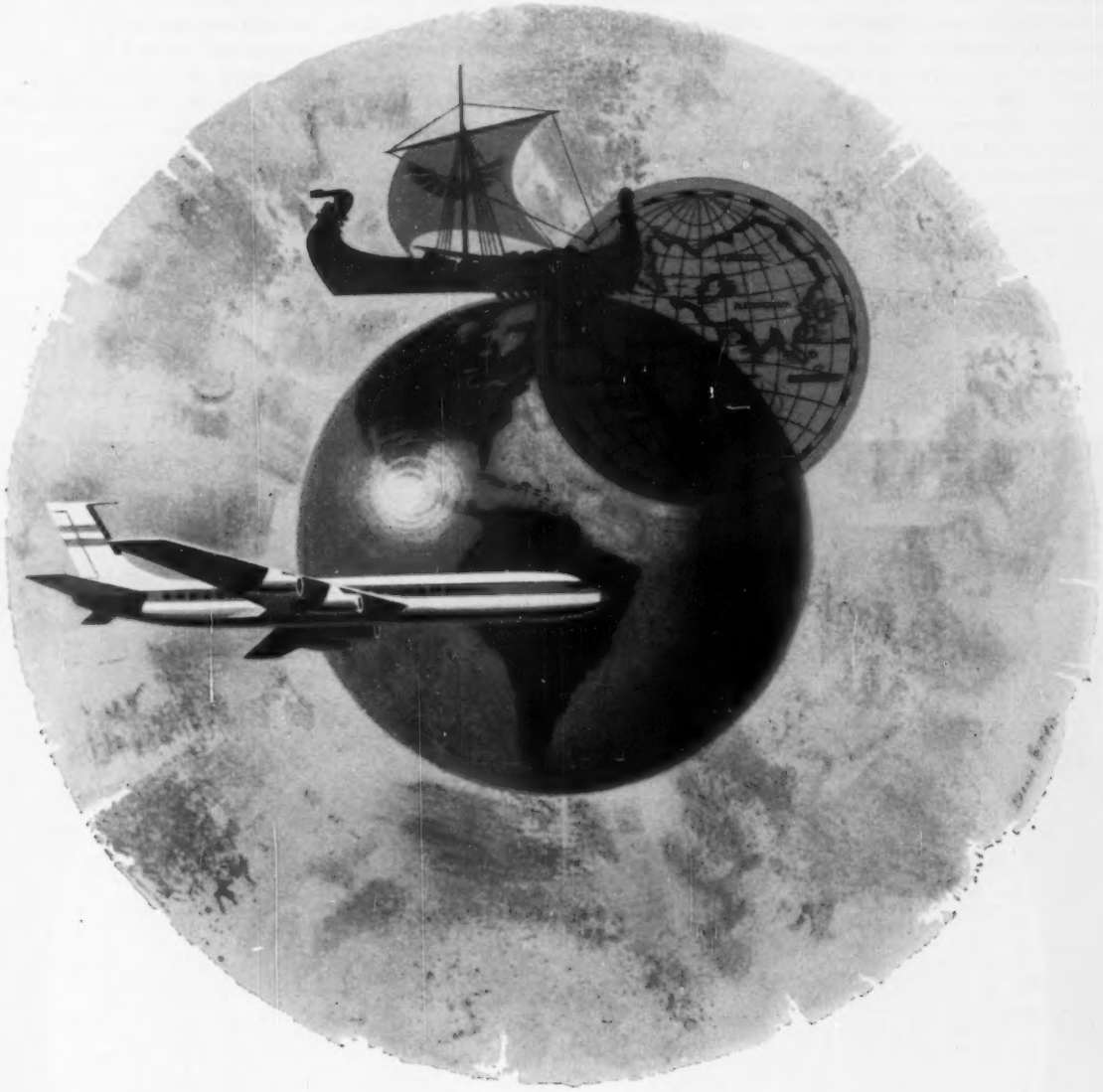
A survey was made to find the most economical approach to compress this gas. We first considered a conventional engine-driven compressor to handle the job. The rental cost of this type of compressor to test the well was quoted at $2000 due to a minimum requirement of three months' rental. There would also be the cost of connecting the compressor, laying a pipeline connecting this well to a transmission line, installing metering and separation equipment, maintenance cost of the compressor, and operating expenditures while the compressor was being used.

On the other hand, a gas jet compressor capable of doing the same job could be installed for $512 for the

TABLE 1. Test data of the Coty Well—instantaneous flow rates, pressures, and temperatures

Suction gas pressure (psia)	Motive gas pressure (psia)	Delivery gas pressure (psia)	Suction gas flow rate Mscf/day	Motive gas flow rate Mscf/day	Motive gas temp. (°F)	Delivery gas temp. (°F)	Ambient temp. (°F)
435	3165	820	565	2285	128	62	78
420	3165	825	572	2278	129	62	79
405	3090	805	470	2280	129	65	80
340	3115	805	510	2320	129	63	78
337	3065	805	500	2250	129	66	84
305	3015	785	435	2315	129	67	84
300	3115	795	430	2300	129	64	85
282	3015	785	420	2280	129	67	85

Coty delivery (suction gas) Mscf/day	Dudley delivery (motive gas) Mscf/day	Ratio—cf motive gas to cf suction gas
565	2285	4.00 to 1
572	2278	4.00 to 1
470	2280	4.85 to 1
510	2320	4.55 to 1
500	2250	4.50 to 1
435	2315	5.32 to 1
430	2300	5.35 to 1
420	2280	5.43 to 1



THE WORLD GETS BIGGER EVERY DAY

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The progress of natural gas and oil has been as dramatic. For one example, Tennessee Gas began operations just 16 years ago. Today, we transport over 2 billion cubic feet of natural gas daily through 12,000 miles of pipeline in 18 states. Explore for and produce gas and oil from Canada to South America. Refine petroleum and market its products in 23 states. We are active in petrochemicals and research.

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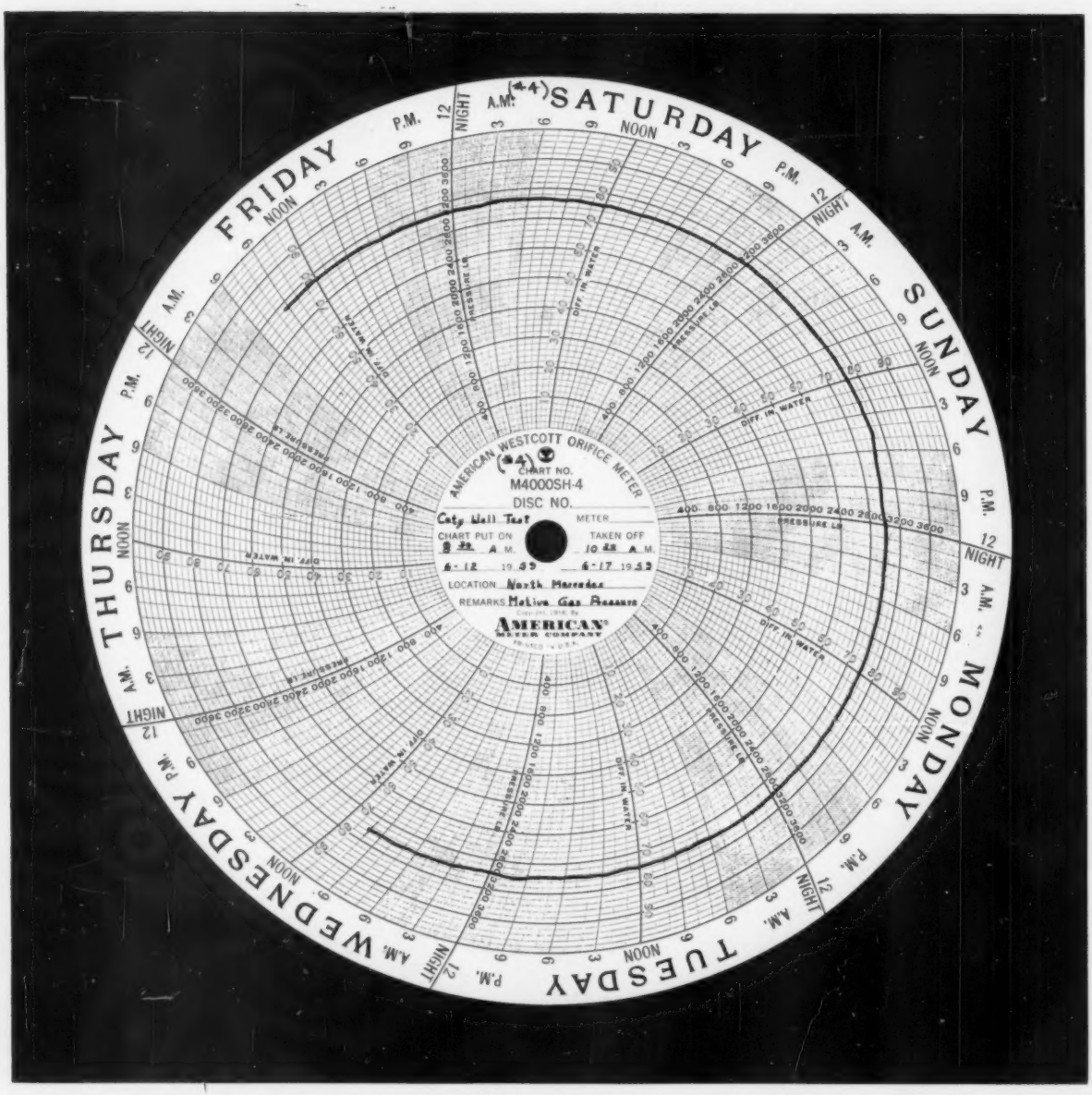
compressor itself, $165 for engineering design work, cost of laying the gathering line, and the expense of installing metering and separation equipment. The operation and maintenance cost would amount to very little in this case since there are no moving parts in the gas jet compressor.

Having decided on a 2-in. jet compressor, we asked C. V. Mooney and Dr. Dotterweich of Texas A. & I. College to design a compressor to meet our needs. The conditions included a motive gas pressure of 3100 psia, a suction gas pressure of 300 psia, a delivery pressure of 800 psia, and a suction gas flow rate of 600 Mscfd. After the engineering design calculations and construction specifications were made, the order was given to a machine shop for construction.

The jet compressor consists of the following parts: a nozzle (0.174 in. diameter) constructed from 440 C stainless steel; a diffuser (diameters—throat, 0.330 in.; entrance, 0.378 in., and exit, 0.660 in.) constructed from 4140 heat-treated steel; all other parts were constructed from standard 5000-psi working pressure fittings.

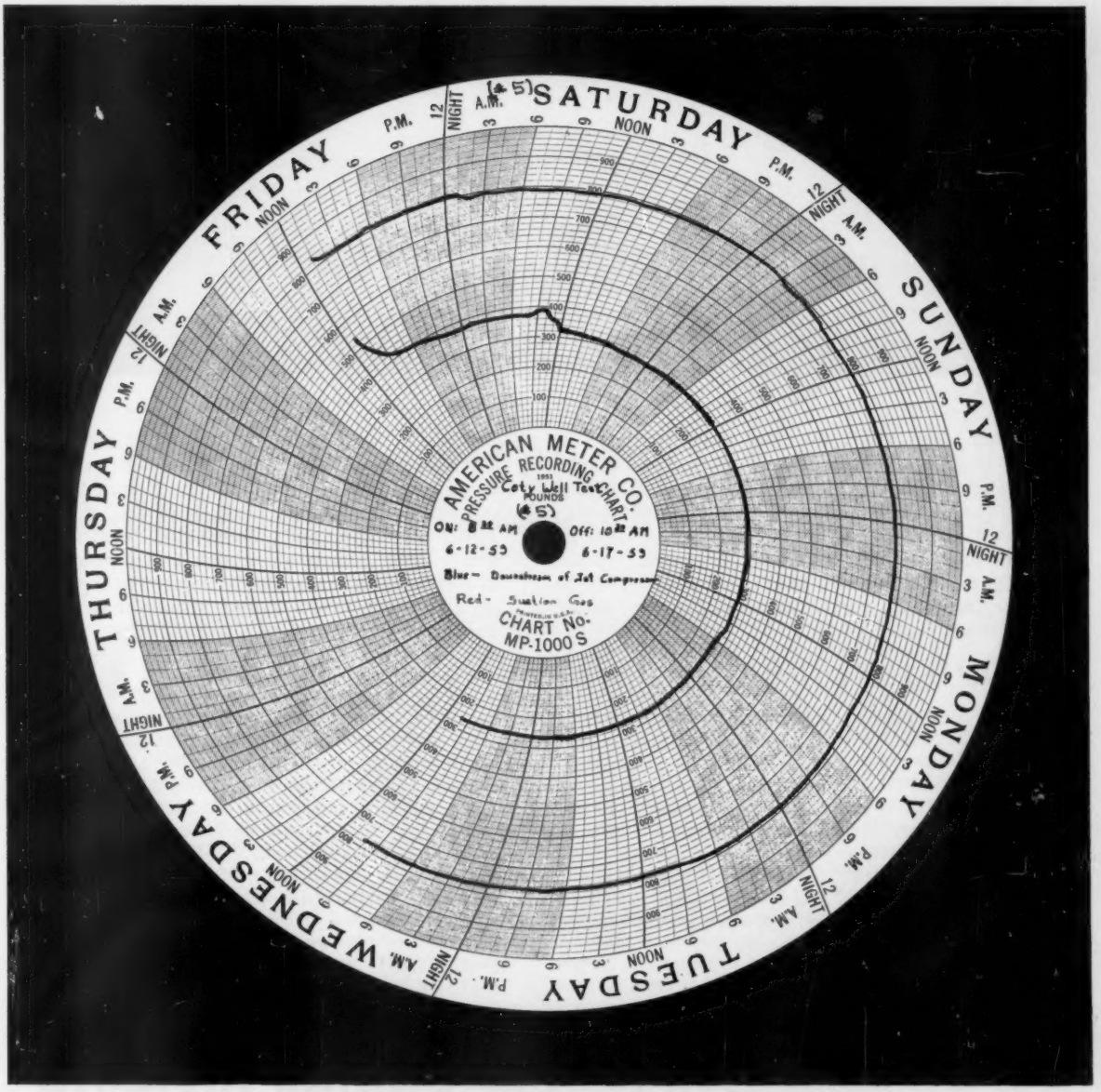


Motive gas pressure

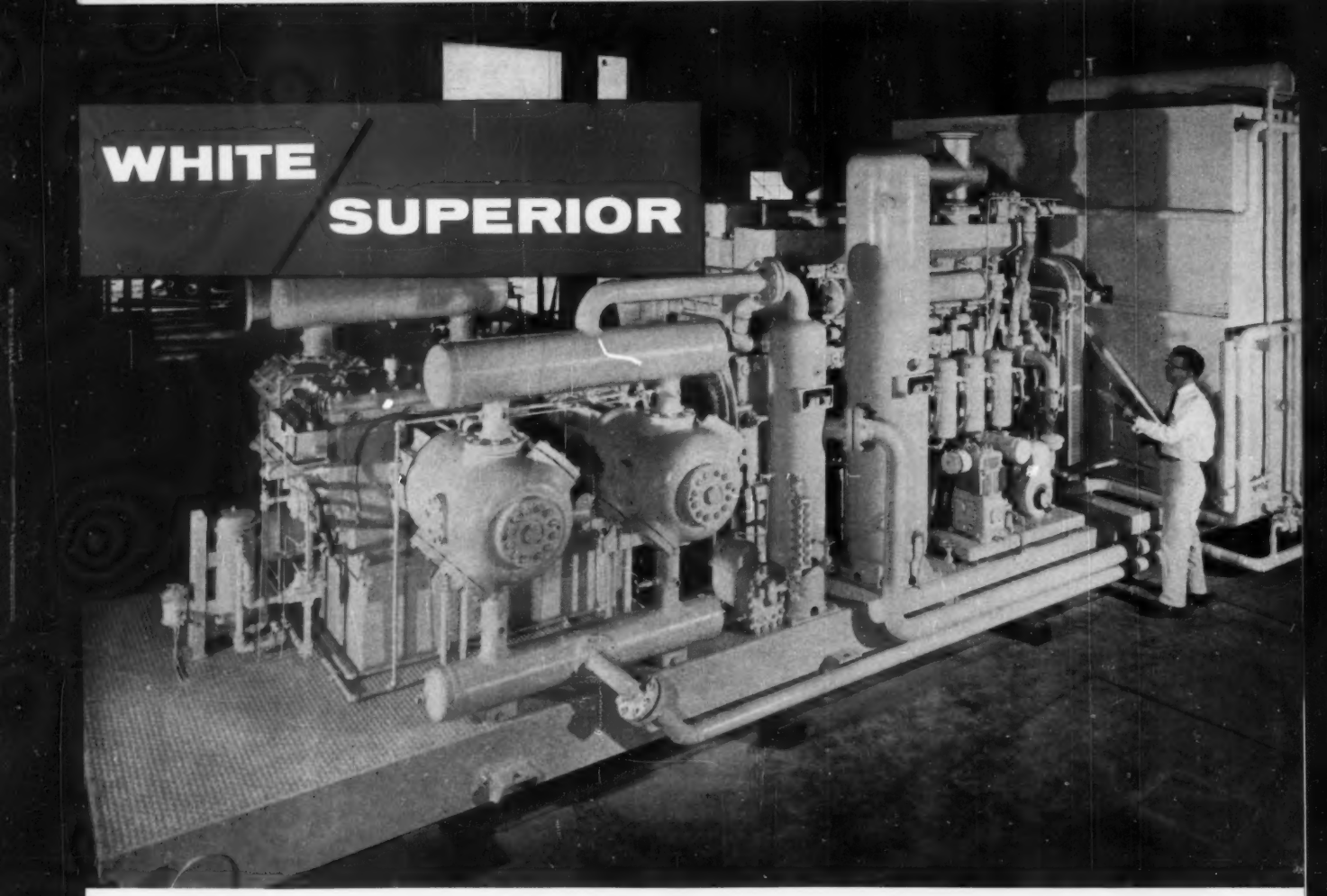
The results of the American Rio Grande Land & Irrigation Co. Well No. 11 test are shown in *Table 1*. The motive gas flow rate ratio to the suction gas rate was approximately 4 to 1. It can be also be noted that the suction and motive gas pressures varied from the design pressures, but desirable operations were still maintained throughout the entire test. From the operations data of *Table 1*, it is evident that the design of the gas jet compressor covers a relatively large application.

We do not suggest that this gas jet compressor will meet universal applications and requirements. However, we have found that in this particular application it saved us about 60 per cent of the cost of using a conventional engine-driven compressor. It appears that there are a number of circumstances where its use is indicated, provided motive gas is available in sufficient quantities and at adequate pressures. We expect to find uses for it from time to time, especially on multi-completion wells. ■

Adapted from 1960 Short Course in Gas Technology—Texas College of Arts & Industries, Kingsville, Texas.



Coty well test. Outer line is downstream of jet compressor. Inner line is suction gas.



White Diesel, manufacturer of dependable, economical Superior engines—renowned throughout oil and gas fields for over 25 years, announces a new line of compressors. White compressors are medium speed, heavy duty, balanced opposed types, 200 to 1000 BHP, and are specifically engineered for combination with Superior natural gas engines.

The complete, compact, *matched design* engine-compressor package provides, continuous, heavy duty service for gas gathering, gas lifting, repressuring and booster applications. Two-cylinder and four-cylinder compressor models in a wide range of cylinder sizes can be ideally matched to Superior gas engine horsepower to meet your most exacting requirements.

Outstanding advantages...

MATCHED DESIGN Six inch stroke White compressors coupled to 9 inch and 10½ inch stroke Superior oil field gas engines provide optimum combinations of piston speed, horsepower and service life.

SINGLE RESPONSIBILITY White assumes complete responsibility for all engine-compressor parts . . . warrants both units one full year . . . offers factory service and replacements parts from its extensive oil and gas field service organization.

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EXTENSIVE CYLINDER RANGE Standard sizes range from 4000 PSI, 2⅜″ dia. to 85 PSI, 22½″ dia., providing 68 different cylinders. Custom sizes and designs also available.

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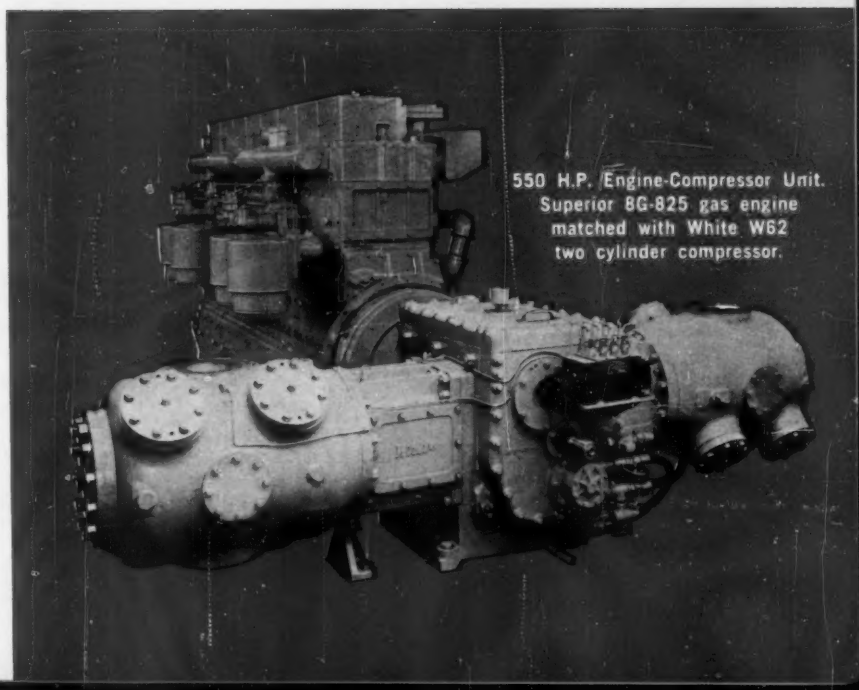

550 H.P. Engine-Compressor Unit.
Superior 8G-825 gas engine
matched with White W62
two cylinder compressor.

This Colorado Interstate Dispatcher is reading gas flow data from four different states...

Foxboro "packaged" gas flow computer located at metering station in South Colorado Springs. Differential and static pressure instruments (right of panel) convert measurements to electrical inputs for the Dynalog* Computer-Telemeter (lower left). Instrument at upper left telemeters down-stream gas pressure.

Foxboro Gas Flow Computing Systems deliver it continuously, automatically

Continuous gas flow totals from 20 metering stations, scattered across four Rocky Mountain states. That's the information Foxboro Gas Flow Computers provide for Colorado Interstate Gas Company in Colorado Springs.

Foxboro Gas Flow Computers do their computing at the metering point. Compensation for temperature and pressure is done on the spot with only total gas flow values being transmitted. Result: transmission line space is saved; errors common to systems that transmit several values are reduced.

Foxboro Gas Flow Computers are furnished as a complete "packaged" unit — calibrated and tested as a system before shipment — ready to install.

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Edited by FRANK CHAPMAN

Talking on the pipe

By F. VINTON LONG

EVERY so often, I have had questions about this business of using the pipe of a pipeline for communication purposes.

I don't think that too many people, especially management, know much about it.

As a matter of fact, there aren't too many engineers who know much about it.

As I have often preached, the best communication repeater is none at all.

Also the best radio system is none at all, but we can't get along without them in most cases.

On the other hand, the pipe is usually laid to where we must communicate, and the use of it for communication purposes just can't be beat. It is about the most solid conductor available, and not subject to static and fading and other things that plague space radio systems.

Of course, some joker is going to pipe up and say, "What happens if the pipe breaks?"

The only answer to that is to ask how many times does the pipe break per year compared to outages on the common carrier and privately owned communications systems.

That pipe doesn't rupture too often.

So—why don't we use it?

Some of us have been trying, using widely varied methods.

And with some success, although it's a long way from perfection.

And we are not the only ones. See "Italy Advances in Pipeline Telecontrol," *Pipe Line News* of July 1959. (Apologies to Fred Ebdon.)

There are three basic ways used or under test by various companies and the AGA:

1. The pipe used as a conductor with the earth as ground return (as used in Italy).

2. The pipe used as the inner conductor of a coaxial cable with the pipe insulating wrap as the dielectric and the earth as the outer conductor or sheath.

3. Using the pipe as a wave guide, tests have been carried out by, I believe, Motorola, El Paso Natural, and lately AGA Task Force NX-32.

Another variation of scheme 1, is the use of cathodic protection d.c. currents. Using this technique, the current is keyed by telemetering signals to transmit information down the pipe. Also, supervisory control signals may be sent to a remote point.

The difficulty with this system is an apparent delay time of the signal in which the intelligence, unless extremely slow speed, might garble, plus the fact that there are usually several cathodic power supplies along a line, and the keying of one only might not cause an appreciable signal determination as required. The cathodic protection men will know what I mean.

Coming back to using the pipe as a conductor with ground return, our friends in Italy found that attenuation for a 12-in. pipe averaged about 7 db per mile for 2000 cycles per second.

The use of the pipe as a part of the coaxial cable devices is entirely practical for shorter distances, such as pipeline laterals in locations where it would be difficult to lease lines or to install a microwave link. You could probably provide sufficient band width for telecontrol up to a distance of 10 or 15 miles without repeaters on the smaller sizes of pipe if they are effectively coated. In this case, the lower audio frequencies would be used and would provide sufficient tones to carry out all necessary telecontrol functions.

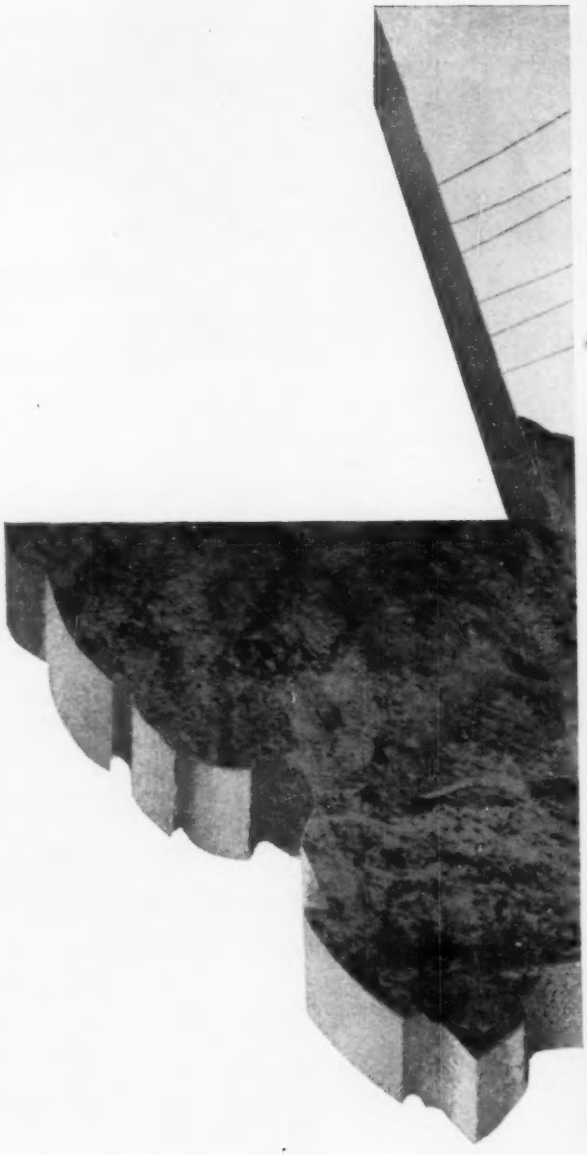
There has been quite a bit of research conducted by AGA, with the assistance of Michigan-Wisconsin Pipe Line Co., to determine the feasibility of using the pipe as a wave guide. It was found that a frequency of about 500 megacycles for a 30-in. section of pipe gave the best performance, and tests were conducted using a section which was internally coated with an epoxy resin.

Twelve db per mile is not too bad a loss, but the big problem is to find pipe which has a smooth interior surface because it was found that rust or scale shot up the losses to an unworkable degree. There also is a problem of inserting the radio antenna within the pipe at the desired locations. The big advantage of a wave guide operation is that it will give you a wide band channel sufficient to carry all kinds of communication channels. If the pipe should happen to be made of a nonferrous metal such as aluminum, the attenuation values should drop down to 2 or 3 db per mile if the interior of the pipe is clean and smooth. Theoretically, attenuation would be as low as 0.5 db per mile, but this could not be obtained in an operating pipeline.

It is not known how this would work in liquids, although I believe that it would not be effective. Loss in the natural gas content within the line is believed to be negligible. Right now, at the present stage of development, it is believed that the coaxial method is most feasible for short lengths of line, while the buried coaxial line operating on audio or carrier frequencies is entirely practical for longer installations. (See "A New Method of Pipeline Communications," GAS, March 1959.) ■

Old Ocean Fuel Company builds 367-mile pipeline...

to meet needs of electric utility for huge quantities of natural gas



Pipeline to carry fuel gas from Old Ocean field to four of the steam-electric generating stations of the Texas Electric Service Company power system

Old Ocean Fuel Company, subsidiary of Texas Electric Service Company, has recently completed a gas pipeline which spans the 367 miles between the Old Ocean gas field in Brazoria and Matagorda Counties and the Fort Worth and Graham areas. Natural gas transported in this line will keep four of the great power plants of Texas Electric Service Company's power system humming.

A. O Smith of Texas supplied 273 miles of 24-inch and approximately 24 miles of 20-inch "Made in Texas" pipe for this project. Since our first shipment of pipe in 1927, A. O. Smith has produced over 50,000 miles of large-diameter pipe. From our Milwaukee and Houston mills comes a dependable supply of pipe for almost every major pipeline project.

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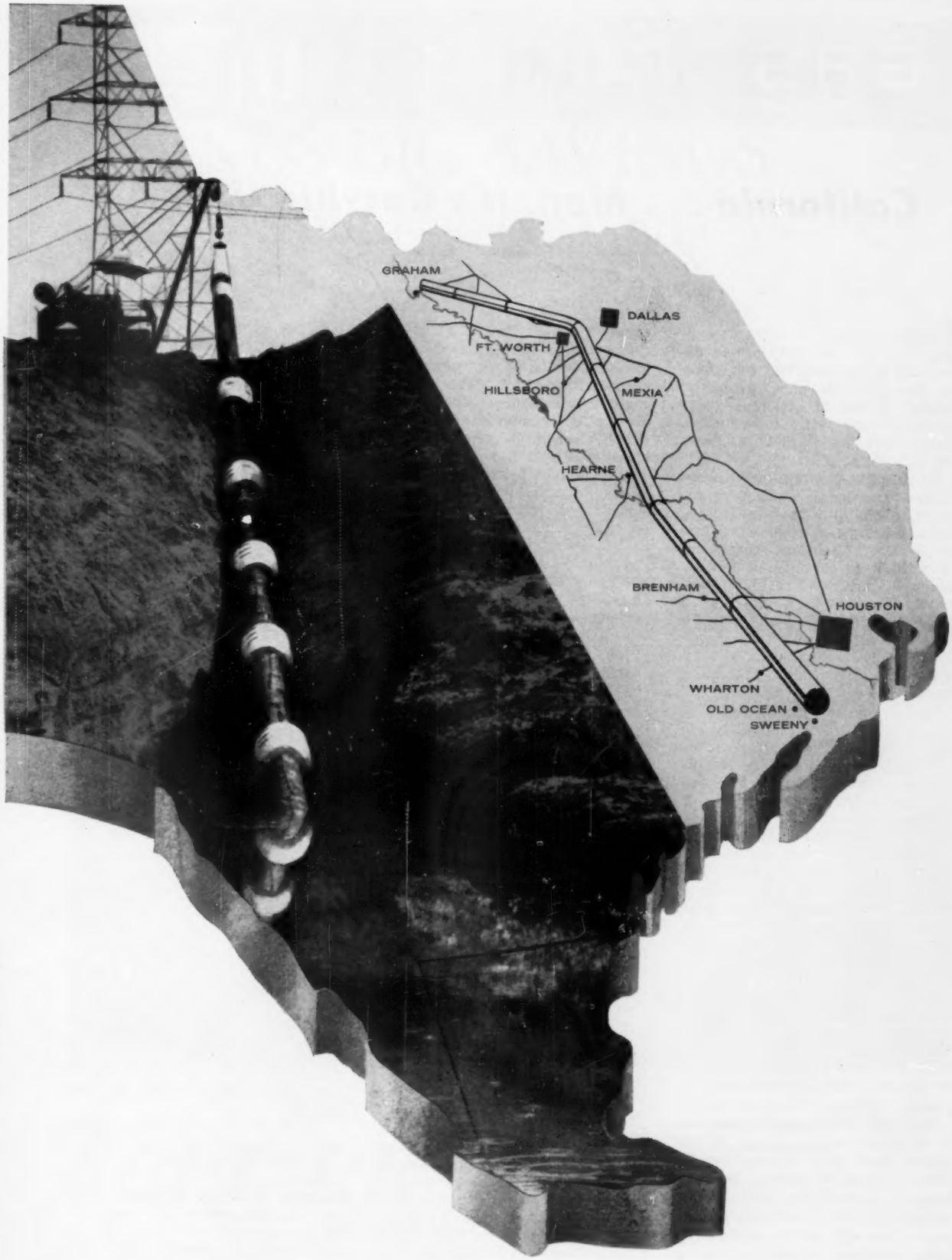
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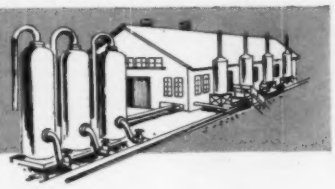
SWEENY

GAS PIPELINE NEWS



California . . . Man, it's Gasville U. S. A.

By J. FRED EBDON, Editor

PERHAPS it's the climate; perhaps it's the public relations effort; it might even be the smog in the air; or, more probably, brother Freud had it figured out correctly long ago. In any case, California's population is growing like mad.

By 1975, the best equipped prognosticators—using much more advanced techniques than tea leaves, ouija boards and fresh statistics of the C of C—inform that from 24 million to 26 million heterogeneous souls will reside in the state. Pacific Lighting Corp.'s Robert Hornby has confirmed the implication that the greatest part of this new population growth will come from the maternity wards.

And 65 per cent of this glut of people is expected to snuggle into already-mobbed southern California. Thereby hangs a terrific tale. Energy supply is the story theme.

It is a very complex story. It involves a gas battle that is hotter than the sunny side of a sinner's tombstone. Skirmish lines have been thrown up by some real heavyweights among investor-owned, energy-based corporations.

The golden grail for which the natural gas knights are jousting is, of course, the madly, continuously growing California gas market. It appears the first beachhead is to be made on the market for industrial gas used to produce power by the light bulb (how old-fashioned can you get?) and hot-wire cooker crowd in southern California.

Northern California? It seems to be pretty stable, as far as gas supply goes, and Pacific Gas & Electric (San Francisco) has not formally entered the battle. It is unlikely that this combination company ever will as in addition to some relatively meager California gas production and a major gas supply from El Paso Natural Gas Co., it is now working away on its own 1400-mile, 36-in. pipeline to connect its market with Canadian gas. A tremendous volume of its present gas supply goes under PG&E boilers for conversion to kilowatts. And a healthy volume of the Canadian gas also will be used for thermal power generation. But anyone trying to peddle gas up there could expect little other than a "we're pretty well set for gas supply, thank you, but why don't you drop by in about 10 or 15 years."

Down south, in California, the situation is a bit different. For years, Southern California Edison Co. (Los Angeles), a giant among electric utilities, has been restless about its large-volume, interruptible gas supply it has from the Pacific Lighting companies. A retinue of high-voltage volunteers — Los Angeles Department of Water & Power, California Electric Power Co., and Imperial Irrigation District—add to the nervousness. These companies, along with San Diego Gas & Electric and a few others, carry "Reddy Kilowatt's" colors throughout southern California.

Southern California Edison is the key. It has long sought a natural gas supply that can deliver firm gas at a long-term fixed price.

In southern California, hydroelectric generation furnishes only a small portion of the power demand and has little potential. So, for the time being, SoCalEd will continue to thermally generate most of its power with either natural gas or fuel oil.

Fuel oil is delightful—if you don't have natural gas — except that the price prances all over the ball park in relation to the world petroleum market. Now it's cheap; next year it may be high again. Edison people still shudder when they remember 1956 and an experience of having their natural gas supply interrupted, forcing them into a particularly high-priced fuel oil market.

Too, there are pressures on SoCalEd, the other electric people, and all industry in southern California, to burn natural gas for smog alleviation. This is a serious factor to any company with a smoke stack or two in this part of the country.

Right now a thing—Rule 62—prohibits fuel oil burning during six months of the year and on other days when measurements made by authorities indicate air pollution has reached an appalling level.

One suspects that SoCalEd and all industry fear that a day might come when the undercurrent of pressures—from the public, officials, various boards and commissions, and from nearly any place else except from the local gas companies and oil companies—might require year-around burning of natural gas by heavy industry. Certainly there are many in the area who feel such an action might really help clear up southern California's smog problem, permitting some of the previously mentioned younger set to be introduced to fresh air.

These are a few of the factors that have sent Edison around the gas patch looking for gas. Doubtless there are others. The big electric company has approached the Pacific Lighting-El Paso supply train, and each one separately. It also considered building its own pipeline.

An early event in such dealings was a May 1956 meeting between Ray Fish of the Fisher Engineering Corp. (Houston), and Harold Quinton, Southern California Edison. A proposition was made to bring Canadian gas through the Fish-promoted Pacific Northwest

Continued on page 120

BIG UTILITY FLEET FINDS BIG SAVINGS

IN '61 LARK PERFORMABILITY

Here is convincing evidence that the '61 Lark can save you money. Four of the country's best-known companies (ranging from the food field to utilities and state governments) thoroughly field-tested the '61 Lark in their regular daily fleet operations prior to introduction.

Many different drivers tested each car, averaging 255 miles apiece at the wheel in their regular work—through city traffic, on high-speed turnpikes, in the mountains, even off-road driving. Results were certified by the United States Testing Company.

The New Skybolt Six engine of 112 HP showed 15.5% to 20.8% higher economy than last year's Six—with a 25% increase of power. Compared to known mileage figures of other cars, these test results indicate superior economy for the '61 Lark—even with its improved acceleration and cruising characteristics!

Other economies to bear in mind are The Lark's high resale value, and fleet-documented savings of ⅓ on maintenance and repairs. All these advantages—with 22 fleet models to choose from—make Studebaker your smartest buy for executives, field service men, meter readers, messengers, installation and repair men.

Other Features of the '61 Lark include new suspension and steering (30% easier), new bonded brakes (up to 100% longer wear), smart low-line styling, safety-padded dash... over 50 improvements, all contributing to '61 Lark *Performability*.

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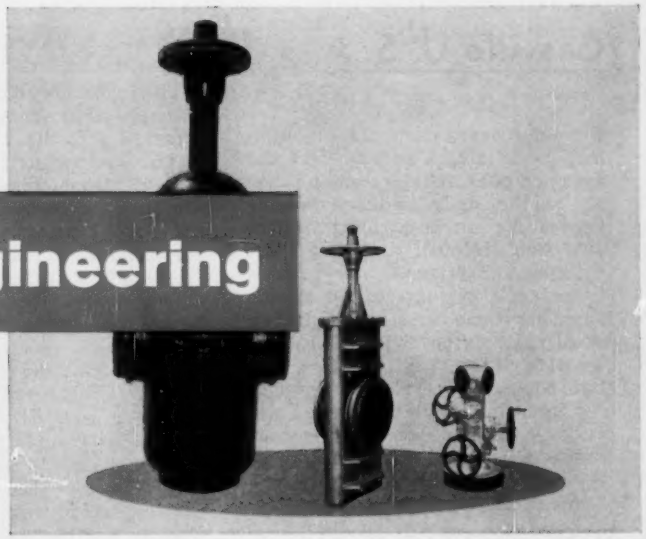

Left to right above, W-K-M's new: *Safe-T-Seal* Gate Valve (ASA); Pressure Sealing Gate Valve (ASA); Cross-type Triple Gate Valve (API).

Unique strain gauge analyzer pre-solves your valve problems

In *seconds* it gives answers that used to take *days*. This unusual digital logging computer developed to W-K-M engineering specifications finds out what will happen to a valve under every conceivable service stress.

The W-K-M computer measures strain, applies corrections for temperature, test material and gauge factors, and prints the results of its stress calculations. It can analyze 40 areas of a valve in less than 40 seconds!

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Gasville U. S. A.

Continued

Pipeline Corp.'s project, then building, to SoCalEd's boilers. But the fuse-and-plug fellows couldn't use all of the daily delivery volume needed for an economical project (say 300 MMcfd), and they (Mr. Quinton and friends) were unable to generate any interest in Pacific Lighting Corp. circles for taking some part of the delivery. Edison tried to interest PG&E also, but that company was already developing its own Canadian project. So, a July 30, 1956 letter of agreement between Southern California Edison and Pacific Northwest for "Scenic Inch" natural gas was terminated, by Edison, on Oct. 2 of the same year.

Later, Edison and El Paso Natural got together on a deal. El Paso was to deliver 100 MMcfd to the electric utility's power plants. But FPC turned this down, saying it would not be in the public interest to make such a boiler fuel delivery while all classes of customers in southern California exhibited demand for gas. Rather, FPC authorized SoCal and SoCounties to take this gas. This delivery was started this year.

In the meantime, two important things had happened. First, Southern California Edison and Tennessee Gas Transmission Co. (Houston) flanged up a happy arrangement (in December 1957), under which TGT would act as exclusive agent in lining up a Gulf Coast gas supply for Edison.

Second, Richfield Oil Corp came racing over hill and dell, in a most cavalier manner, with a pipeline bringing California-produced gas to a SoCalEd steam plant via a direct industrial sale. A minimum of paperwork was indulged in by Richfield. The Pacific Lighting companies hollered "foul."

California Public Utilities Commission ruled that Richfield was a little shy of paperwork and would have to act like a public utility. However, the oil company declined to submit to PUC jurisdiction and the courts (as far as the case has gone, which is pretty far) have held that it is all right for Richfield to sell gas to Edison's power plants in direct competition with Pacific Lighting Corp. companies, which must submit to Cal-PUC jurisdiction.

You might say this really opened the gate to any and all who might want to come dashing down the lane with a direct industrial sale of gas in California.

Then, Transwestern Pipeline Co. entered the gas-pipeline ring-around-California. Its just completed system brings up to 345 MMcfd from the Southwest to southern California. Pacific Lighting Corp. companies seemed to favor certification of this project. One might have gathered the impression that they were not unhappy to see their market connected with another supplier in addition to their traditional and very creditable supplier—El Paso Natural. Too, El Paso put forth no above-the-surface opposition to Transwestern.

El Paso Natural, in fact, quietly went ahead with its integration of Pacific Northwest Pipeline's system into its own, and planned to file for the "Rock Springs" pipeline project, which will, if FPC certificates, bring additional Canadian and Rocky Mountain natural gas to the southern California distributors. FPC hadn't announced a decision on Rock Springs as we went to press.

Back to Transwestern; this company recently offered an additional 150 MMcfd to the southern California market via the Pacific Lighting companies. This offer was turned down. Since then, this Houston-based pipeline operator has been trying to sell this gas to any and all comers in the terminal market area.

And back in Houston, while much of this was going on, TGT was exploring various methods and projects for moving gas to Edison. Earlier this year it rocked the gas industry with announcement of an agreement with Petroleos Mexicanos (Pemex, out of Mexico City) calling for a project that will pick up some gas in west Texas, saunter down into and across Mexico — picking up gas from Pemex while making the trip—before taking a tack back into the U. S., crossing the boundary at the California line and homing in on the Los Angeles area steam generating plants of SoCal Edison.

This is the now famous "Enchilada Inch" project—so-named by GAS Magazine as an expression of our firm and long-lived affection for our fine neighbors to the south and to this palate-tickling dish. It is a mere token of our efforts toward international good will for the year. In short, we are very fond of Mexico, its people, and its food.

While it has been said that the Enchilada Inch project has been thrown in merely to confuse the Rock Springs project issues, we can only say that it looks to us that TGT-Pemex, et al, are moving ahead on it and mean business.

Enchilada Inch brings powerful factors into play. Huge interruptible loads, such as the power plants, are vital to balancing system operations of Pacific Lighting companies. Losing this balancing-by-interruptible capability for off-peak gas would force them into development of vast storage operations. This eventuality would cost a lot of money. One estimate, from Pacific Lighting, has pegged the extra cost to consumers, if storage has to be substituted for interruptible sales for load equating, at anywhere between $10 million and $75 million a year—which is quite a spread. Following through, the average domestic consumer's gas bill might jump by $4 to $30 per year. (This includes ye editor's gas bill, so I will unleash to say with tongue in cheek—but with this organ about set to come out of cheek—that everybody involved in the whole thing had better take a close look at what they do or don't do.)

The gas companies point out that Edison elected to take only about 65 per cent of the gas offered it by SoCal and SoCounties in 1958, and only about 50 per cent thereof in 1959. They say they can supply the Edison plants. On Nov. 15, they placed a charge before California's PUC that Edison is ". . . not operating in the best interests of the people of southern California by attempting to corner an independent supply of natural gas." Interestingly, the gas companies brought out that only three of nine SoCalEd steam plants are located where they are under the jurisdiction of Los Angeles County's Air Pollution Control District.

A further factor is the regulatory jurisdiction — if any — that state commissions and the FPC have over Richfield, the Enchilada Inch, and any others who might jump into the picture. It appears that nobody has much control over Richfield. It also appears that FPC will not have full control over the Enchilada Inch.

It looks to us as if the Enchilada Inch needs Presidential Permits to move gas across the border in two

Continued on page 122

What's so special about the huge fractionating tower shown here? It is one more example of how Sun Ship builds and delivers heavy industrial equipment on barges or sea-going vessels, with careful attention to such requirements as safety and on-time schedule.

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Gasville U.S.A. Cont.

places, but very little else. But who really knows?

President Eisenhower has delegated FPC to make recommendations on Presidential Permits under his administration. We don't know if President-elect Kennedy will follow this same procedure or not since he declined to clear this up for GAS Magazine when we asked him a related question prior to the Nov. 8 elections. In all fairness, Vice President Nixon also declined.

So, FPC will probably have some control short of full-scale certification. The fact that Humble Oil & Refining Co. signed a 20-year agreement with SoCalEd for gas supplies to be delivered through the Enchilada Inch also bears out this speculation. Humble has never been inclined to play footsie with FPC or with pipeline projects under direct FPC jurisdiction.

Humble Oil's participation brings Standard Oil Co. (N.J.) into the picture since the fairly recent reorganization leaves them almost one and the same. Jersey Standard (like Humble itself) is a formidable competitor for anyone.

Still another factor is the foreign relations implications of the Enchilada Inch project. It will invest some $160 million plus in Mexico. Much of it will go for Mexican products and labor. It will open some construction and operating jobs for Mexican nationals. It will buy Mexican gas and take it to market. And Pemex, i.e., the Mexican government, will own the project in 20 years. The U. S. State Department and the public might well be pleased to see this pipeline go in, in view of the current Latin American scene.

So, that's about how it shapes up. On the one side you have Southern California Gas Co., Southern Counties Gas Co., Pacific Lighting Gas Supply Co., Pacific Lighting Corp., El Paso Natural Gas Co., Transwestern Pipeline Co., most of the oil companies and fuel oil dealers, and probably some indirect help from Colorado Interstate Gas Co.

The other side of the fracas lines up with Southern California Edison Co., most of the other electric utilities in the area, Tennessee Gas Transmission Co., Petroleos Mexicanos, Humble Oil & Refining Co. and Standard Oil of New Jersey, with perhaps some feeling to be thrown in here and there by both the Mexican government and our State Department.

On one hand, this situation is an example of good, healthy business competition which displays the best qualities of the private-enterprise system. Southern California Edison has a particular kind of gas demand that seemingly has not been satisfied by those gas companies previously serving it. TGT, et al, propose to serve this demand through strictly legal operations and with no attempt to end-run any existing regulatory control.

On the other hand, those now serving the entire market area feel that they need the existing interruptible load—not for themselves, but for the best interest of the 8 million people who use gas in their service area. Perhaps they feel they have had an around-the-corner straight dealt them in the game of gas marketing by a group that decided to sit in on California's game pretty late in the evening.

In any case, both factions are determined. Both have some very responsible and know-how people in their managements. Each side has demonstrated in the past that it knows how to get things done. Neither will tend to give up easily.

We can guess, but we don't really know how it will turn out. We will just say we hope that with such heavyweights bumping together in the gas industry's rumpus room, nobody will get seriously hurt in the byplay.

Are we asking for too much?

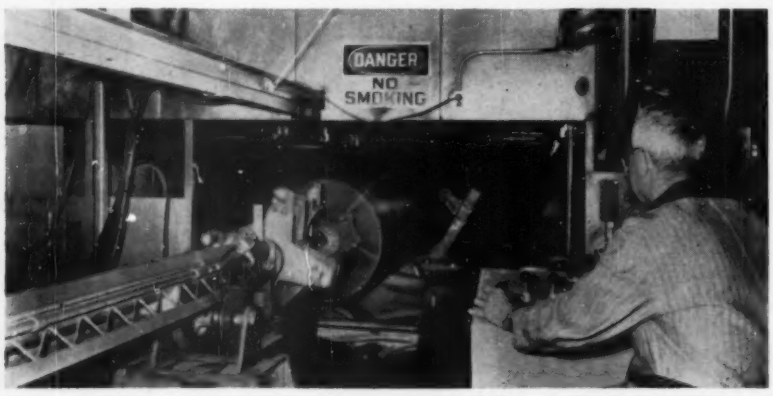
Gas goes for oil production

Despite protests, Presiding Examiner Glen R. Law authorized two independent producers to abandon sales of natural gas to Montana-Dakota Utilities Co., Minneapolis (Dockets G-18704 and G-18803).

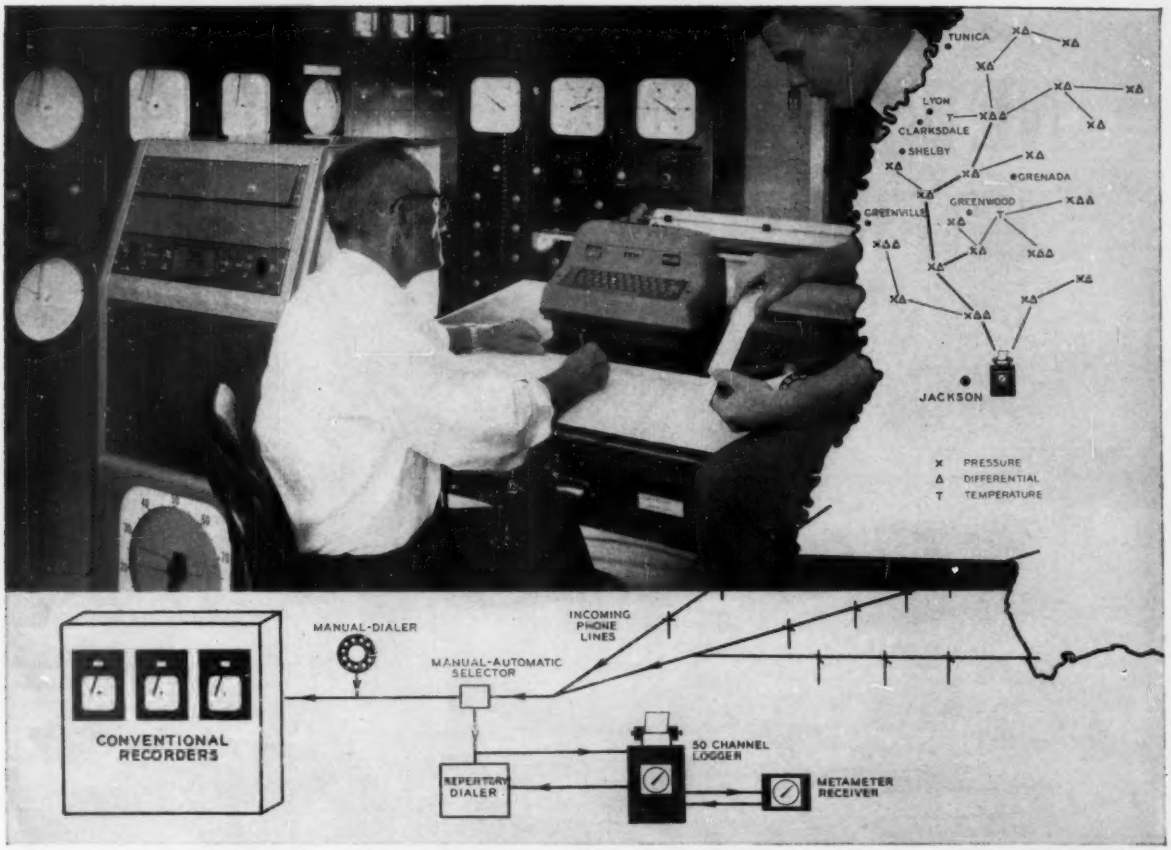
Examiner Law said the reserves of the Frontier formation in the Little Buffalo Basin field of Wyoming will diminish within three years to a point where further production would not be feasible. The producers—Pan American Petroleum Corp. and Ohio Oil Co.—plan to use the remaining natural gas to help boost oil production from area wells.

Montana-Dakota and the FPC staff opposed the abandonments. Montana - Dakota cited economic loss to it and its customers should the sales be curtailed before depletion. Law said that the maximum loss to Montana-Dakota would not exceed $200,000. The additional oil recovered through the use of this gas, he said, would have an economic value of not less than $1 million. The producers estimated it as high as $19 million.

The examiner conditioned the Pan American certificate to require the producer to sell the remaining production to Montana-Dakota in the event the oil recovery program was abandoned.



Modern equipment for the internal coating of large diameter line pipe has been installed at A. O. Smith Corp.'s Milwaukee plant. Unique features of the operation include preparing interior surface of the pipe with a thorough scrubbing and rinsing—heat being added both before and after these operations. Final painting is done under controlled venting conditions. Composition of coating and application methods are specified by the line pipe customer. Present equipment permits coating pipe between 16 and 30 in. in diameter. Actual spraying (see photo) is done with hydraulic equipment moving through the pipe under a venting hood. A multi-nozzle spray head operates as the pipe rotates.



Bristol Metameter* Telemeters (on panels) and Data-Master* digital data logger (foreground) in central dispatcher's office of Mississippi Valley Gas Co., Jackson, Miss. The Data-Master automatically types out instrument readings from points shown on map. (Punched-tape output also available.) **T. M. Reg. U. S. Pat. Off.*

Big change at Mississippi Valley Gas:

Digital Data Logging by Bristol

Amazing boost in telemetering efficiency, economy, and system control effected by "Data-Master" digital data logging.

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Today there's an even greater advance in this outstanding system: "Data-Master" digital data logging equipment, manufactured by Data-Master Corporation, a Bristol subsidiary, has taken over the routine dialing and recording of data. As often as three times an hour, the Data-Master equipment *automatically* "dials" the remote stations (see map), and *automatically* types out the instrument readings on an electric typewriter. All without an instant's attention by the dispatcher. What's more, any time the dispatcher wants a specific reading, he can still manually dial any station for the reading.

Easy avoidance of contract penalties on purchased natural gas, efficient operation at near capacity, ability to give long notice to users classified as "interruptible" (allowing them to switch to standby fuels), freedom of skilled operators from the tedious routine of manually recording instrument readings (and avoidance of errors) are just a few of the benefits reported by Mississippi Valley Gas.

Bristol offers a complete telemetering systems engineering service to natural gas pipelines and distribution systems, oil pipelines, electric power systems, water plants, and industrial plants. Our engineers will welcome an opportunity to discuss your specific telemetering problems, or we'll send you literature. Write: The Bristol Company, 119 Bristol Road, Waterbury 20, Connecticut, a Subsidiary of American Chain & Cable Company, Inc. O.38

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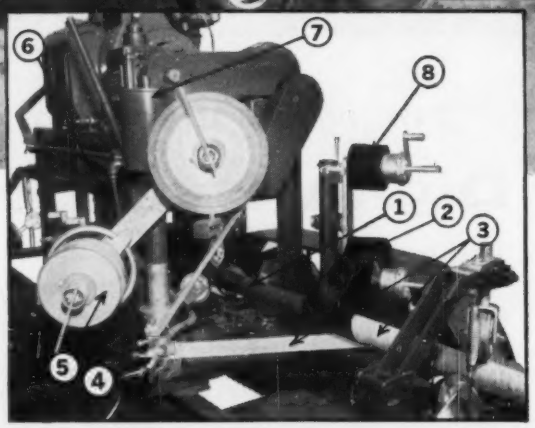

Pipe (coming toward you) spins through machine . . . undergoes dynamic cleaning from twin-powered brush heads. Coating comes off brake-type tape drum. Outer wrapping runs through fast-gluing adhesive attachment.

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2. Polyken tape coating
3. Outer wrap
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6. Power brush heads
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8. Stand-by tape turret

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Seattle, Washington
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FPC covers Louisiana gas in amendment

FPC's first amendment to its Sept. 28 statement of general policy (the Phillips case), set a price level of 20.96 cents per Mcf for initial sales from southern Louisiana and the entire state of Mississippi.

The price is based on a pressure of 14.65 psi. This would be 21.5 cents at 15.025 lb. The Sept. 28 statement set price guides at 13.7 cents for existing contracts in southern Louisiana and Mississippi.

The commission said that the level set by the amendment represents "our judgment as to a proper price at this time, based upon current conditions and a full and careful consideration of all of the factors set forth in our original statement." The price applies to sales not previously considered in connection with permanent certificates. Previously authorized sales, at this or other levels, "were the result of our judgment of the situations at the time those cases came before us," FPC said. The new announcement, it continued, "is neither a repudiation of our previous decisions nor a pre-judgment of the cases presently being reconsidered separately by us upon remand from the Supreme Court."

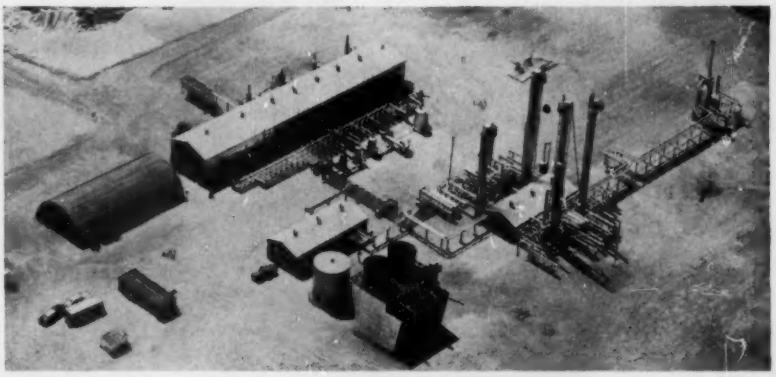
On Sept. 28, FPC pointed out that the southern Louisiana and Mississippi price levels were the subject of two hearings being held pursuant to Supreme Court decisions. The FPC said that since Sept. 28 it had found that the great number of proposed sales from the area now involved in certificate proceedings "renders it imperative that a price level be announced." It added that large amounts of gas "vitally needed" from this area cannot "be given consideration and certification consistent with sales from other areas under our new policy unless all parties . . . are aware of exactly what initial price level we feel is presently appropriate."

Chairman Jerome K. Kuykendall dissented on the amendment to the policy statement. Commissioner Paul A. Sweeney did not participate.

Steel mill expansion announced

E. B. Germany, president of Lone Star Steel Co., Dallas, describes his company's expansion program as one that will carry the steel mill into two or three entirely new markets.

New or expanded facilities authorized and slated to be in operation by the middle of next year include the spiral weld pipe mill. This is an entirely new facility capable of making steel pipe from 16 to 80 in. in diameter. Special lining and coating equipment is included. The new stretch-reducing mill will produce standard grade black or galvanized pipe. New equipment will allow coatings or linings of recently developed materials such as epoxy and plastic.



Ohio Oil Co. has the major interest in this natural gasoline processing plant in the Albion-Scipio-Pulaski oil and gas field of southern Michigan. Only 70 miles from either Detroit or Toledo, the plant is 150 miles from Chicago and 210 miles from Cleveland. Some 20 MMcfd of natural gas is currently being handled by the plant. The plant also provides Consumers Power Co., Jackson, Mich., with about 14 MMcfd.

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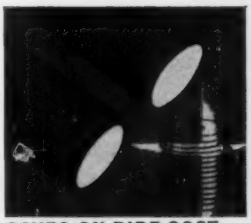

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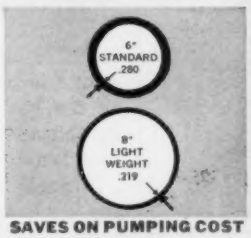

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NO TIME OF YEAR FOR TB. Is there ever a right time? Of course not. But Christmas, more than any other season, should be a time of glowing good spirits, health and happiness. In the fight against TB, it can at least be a time of hope—when millions of healthy Americans take an extra moment to help with each Christmas Seal they use. Give that spark of hope—and the needed help—by using Christmas Seals. What could be more fitting for a season of good will to men? Answer your Christmas Seal letter today.

United takes on new customer

United Gas Pipe Line Co., Shreveport, can begin gas service to Clarke-Mobile Counties Gas District of Grove Hill, Ala. (Docket CP60-38). The presiding examiner's decision is subject to review by the commission.

Peak-day needs of the district are an estimated 13.4 MMcf. United will build a 0.03-mile, 6-in. pipeline stub leading to a sales meter station and appurtenant facilities.

The district—formed by the municipalities of Jackson, Grove Hill, and Thomasville—will build a $3 million distribution system to receive and supply the gas. The presiding examiner said the new project supplies one of the last areas in Alabama not now served by natural gas and an area with a sizable and expanding domestic and industrial market.

Longer pipe available

Cal-Metal Pipe Corp. of Louisiana has redesigned its Baton Rouge plant to furnish its customers with pipe lengths of up to 65.5 ft.

Executive vice president R. C. Stewart said the 30-per cent longer pipe means 34 fewer field welds for each mile of pipe laid.

U.S. Industries joins divisions

Consolidation of two major oil and gas production equipment divisions of U. S. Industries Inc. was announced by John I. Snyder Jr., chairman and president.

Involved are USI's Axelson division of Los Angeles and St. Louis and the Garrett Oil Tools division of Longview, Texas.

Snyder said that Garrett and Axelson will be merged into one major USI operation to manufacture, sell, service, and distribute all USI oil and gas equipment.

Headquartered in Longview, the division will be known as the Axelson-Garrett division. Taylor Milton, president of the Garrett division, heads the new division.

Sales stoppage okayed

Three independent producers can abandon sales of natural gas to United Gas Pipe Line Co. (Dockets G-18533 et al). In making the ruling, FPC upheld a decision of presiding examiner Samuel Binder.

The producers are Phillips Petroleum Co., Tidewater Oil Co., and the Atlantic Refining Co. Gas was sold to United from leases in the Lewisburg field, Acadia parish, La. The gas will be diverted to Texas Gas Transmission Corp.'s system.

Washington • *Cont'd.*

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the Presidential debates, whether or not important, and the new face in the White House, alter the approach and tactics of both old and new members of Congress.

There'll be no letup in attacks on the depletion allowance. In 1962, there will undoubtedly be a major effort to cut the oil and gas rate—just before the new congressional elections.

The fuels policy outlook is even more grim. In spite of nearly unanimous opposition to the end result that the sponsors (primarily the coal industry) seek, support for a study of the fuels policy question appears to be strong. Opposition to any end-use control feature of any fuels policy is general, but many opponents are not opposing the study, although they know that this will be simply a formality.

A start on revising the federal regulatory agencies is another likely prospect for 1961. First step will be legislation to block off-the-record contacts between industry and regulatory commissioners.

Mexico line boost

GOVERNMENT efforts to increase U. S. private investment and travel in Mexico to offset a rising Communist threat there may help Tennessee Gas Transmission Co. plans to build a pipeline through that country. Similarly, it may also help other plans to import Mexican gas and to invest in gas and oil production projects.

Officially, our State Department says that the TGT proposal to run a line from the Texas-Mexico border through Mexico to California

is a matter for the Federal Power Commission. Officials at the Department say they'll give their views only if asked by the FPC should the project proceed to the point of formal commission consideration.

But State Department officials in the past few months have quietly created a strong undercurrent throughout the government to reinforce its drive to step up U. S. investment in Mexico. There's a good chance that the FPC already is well aware of the State Department's desires, although the two agencies would probably never admit to any such informal discussions.

The situation behind the new State Department drive to boost dollar exports to Mexico, although kept as quiet as possible, is an interesting example of economic diplomacy in the cold war.

While the Reds have been attempting to keep U. S. attention drawn to Cuba and Africa with power politics, they've been sharply stepping up efforts to bring Mexico into the Communist orbit.

So far, the Reds haven't scored any major victories in Mexico. But they have managed to begin eroding the good will between the U. S. and its southern neighbor. They've been trying to develop a fear by U. S. businessmen and tourists that there is a danger to property and visitors there. Recent student riots and Red demonstrations have been the principal weapon so far. (U. S. intelligence sources do not believe there has been an increase in the number of card-carrying Communists or in Soviet spies, although those that are there have come out into the open and become more vocal.)

Behind the Red efforts to destroy mutual good-will between the two countries is the hope that they can force Mexico into the Red economic camp. U. S. business is vitally important to the Mexican economy. American investment has been rising rapidly there in recent years, and now totals more than $100 million. U. S. tourists are even more important, spending some $1 billion a year south of the border.

If the Reds could materially reduce this U. S. dollar flow, they believe they could force the Mexican

Merry Christmas ✳ Happy New Year

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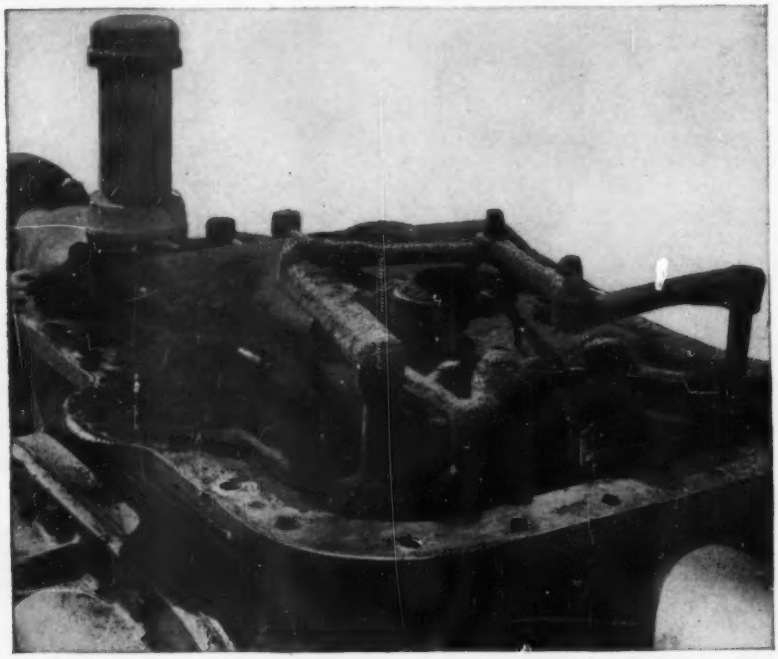
government to turn to Moscow for help. The Soviets recently offered the Mexicans $200 million in credits to be used for industrial plants and equipment, scientific and medical supplies, or just about anything as long as it carries the "made in Russia" label. The offer was received but not accepted by the Mexicans "for the time being."

Our foreign experts also note an increase in efforts of the hidden Reds in Mexico to emphasize the expropriations of U. S. property 20 years ago to try to imply that there is still this danger. Facts don't bear this out. In recent years, any foreign-owned property that has been condemned has been paid for in what our experts say is fair reparations.

President Eisenhower's two trips to visit Mexican President Adolfo Lopez Mateos (one in late October) and increased official government tours and expressions of good will are aimed at offsetting this Red drive.



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GAS Pipeline People

C. H. Calvert Jr.
Northern

Thomas Giles
Royston

C. H. CALVERT JR. has joined the gas reserves and availability division of Northern Natural Gas Co., Omaha, as a reserve engineer.

THOMAS G. GILES has succeeded the late HARRY W. STROTHMAN as Chicago district manager of Royston Laboratories. Chicago territory covers Illinois, Indiana, Iowa, Wisconsin, and Minnesota.

ROBERT L. SKAGGS is office manager at the new Big Sandy plant of Pittsburgh Chemical Co.'s Activated Carbon division in Catlettsburg, Ky.

JIM LAWRENCE has transferred to Houston as sales engineer for Black, Sivalls & Bryson's Controls division. At the same time, JON YOUNG was transferred to Denver. Two new sales engineers have been added to the division's sales organization—LES STILLWELL at Los Angeles and JIM MARTIN at Borger, Texas.

A. F. HAMILTON has been elected vice president and general manager of Texas Gas Exploration Foreign C. A., the wholly owned foreign operations subsidiary of Texas Gas Exploration Corp. Hamilton headquarters in Calgary.

PAUL W. SHELDON is advertising coordinator for all domestic and international advertising, media research and advertising planning for Gulf Oil Corp., Pittsburgh.

DON S. WILLHELM is chief engineer for the Trans-Southern Pipeline Corp., wholly owned subsidiary of Transcontinental Gas Pipe Line Corp., Houston. Before his new assignment, Willhelm was senior engineer in charge of special projects in Transco's operating departments.

WALTER S. BOWERS has joined Foxboro Co., where he will specialize in sales promotion and instrument engineering.

P. T. BLOODSWORTH has been appointed eastern sales manager for Kaiser Steel Corp. He will head the company's sales office in New York City.

WILLIAM A. CARROLL JR. has been promoted from sales manager to manager of marketing by the Industrial Silencer division of Burgess-Manning Co., Dallas. R. T. OLIVER JR. goes from New York district sales manager to sales manager for domestic operations.

Bendix Computer division has named two computer applications representatives. They are RICHARD C. RUDE in Washington, D. C., and JOSEPH M. GALANTE in New York City.

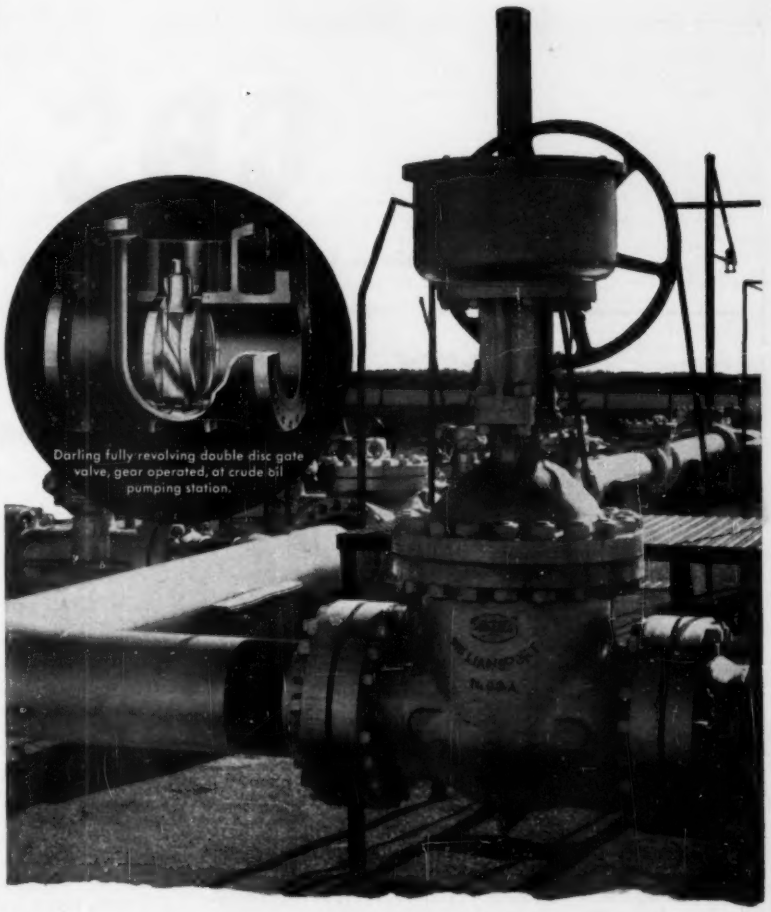
Consolidation of the West Allis centrifugal pump department and the compressor department under the management of E. F. GRIEWE is announced by Allis-Chalmers. He is succeeded as manager of the Norwood (Ohio) Works centrifugal pump department by R. J. DINEEN.

LESLIE M. CASSIDY, former chairman of the board and president of Johns-Manville Corp., and JOSEPH H. KING, partner in Eastman Dillon, Union Securities & Co., are new directors of Olin Oil & Gas Corp., New Orleans.

HUGH J. DAVIS has been named division landman for Texas Gas Exploration Foreign C. A. Davis headquarters in Calgary.

JAMES R. CRAINE has been promoted to assistant manager of the east-central sales district of Cooper-Bessemer Corp., Mt. Vernon, Ohio. He has been branch manager of the Mt. Vernon sales office for the past two years. Cooper-Bessemer also announces the appointment of JOHN O. FIGHTER to the International division office in New York. Replacing Fighter as branch manager of the Anaco, Venezuela, office is W. R. BOHANNAN, formerly a sales engineer in the Caracas office.

DR. FOREST C. MONKMAN is now vice president, research and engineering, at Walworth Co., New York. Dr. Monkman joined Walworth in 1955 as research director.



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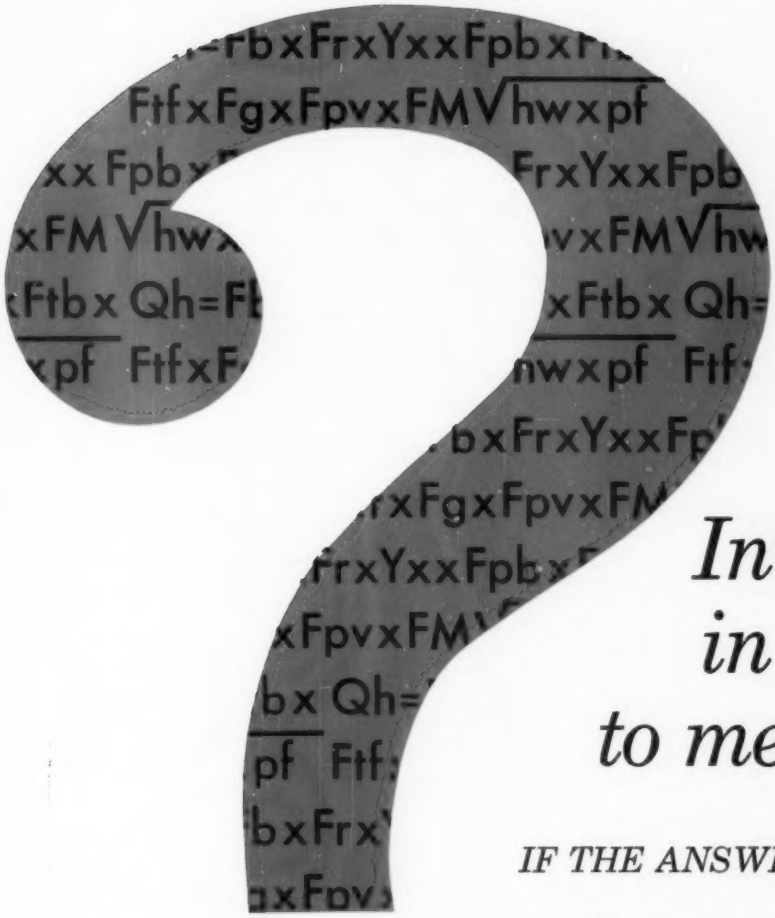

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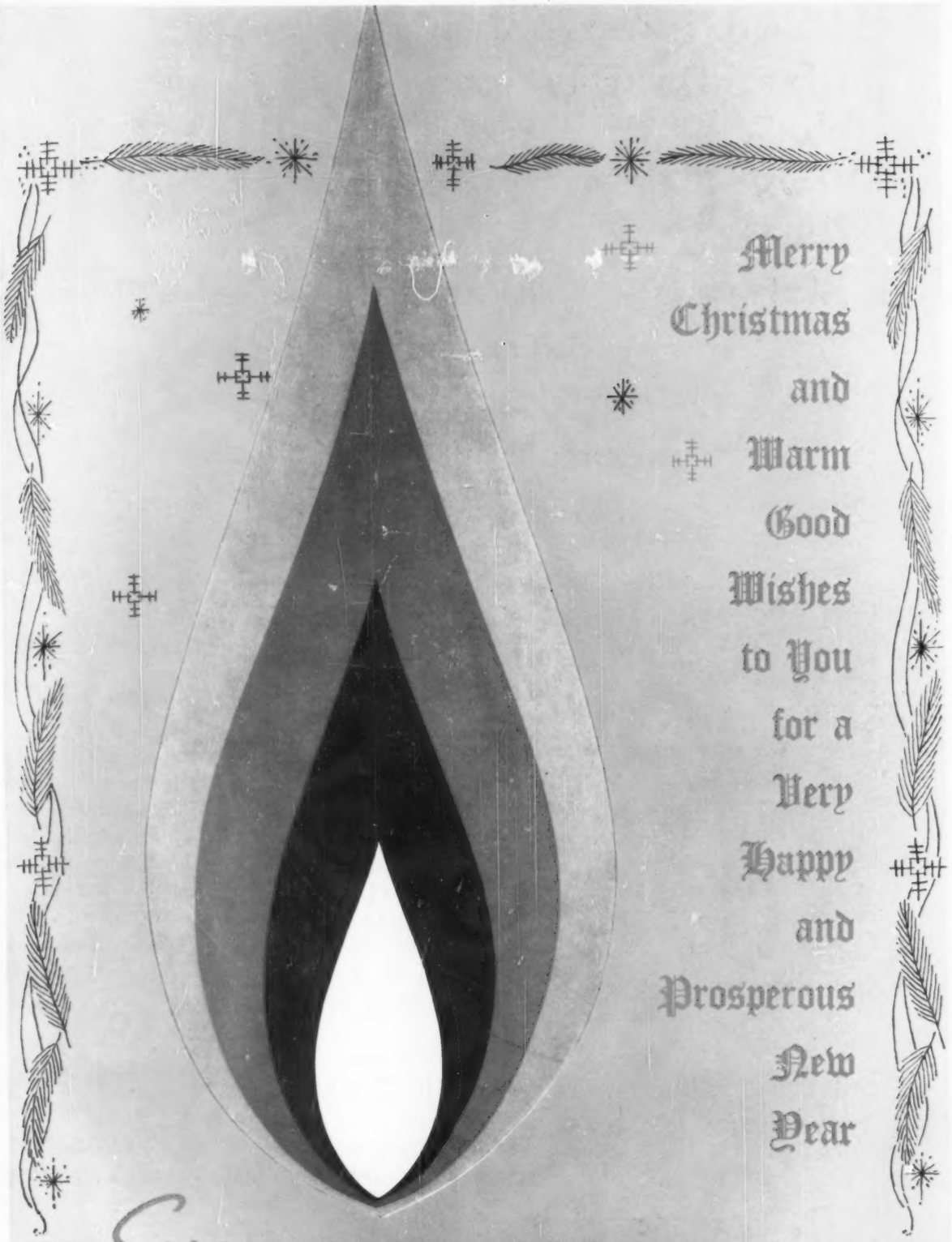

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